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Manual for Evaluating Predicted and Actual Impacts of Construction Grants Projects

ESEI/EcolSciences, South Bend, IN

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A detailed methodology has been developed which determines the accuracy with which planning and environmental review documents (NEPA documents) assessed predicted environmental effects of Construction Grants projects.

The methodology was developed to evaluate the entire spectrum of Construction Grants projects. In general, evaluations are possible for three types of situations: single project; aggregate of projects; and an entire program. Specific components of the methodology include the use of: (1) a simple set of procedures; (2) a standard set of issues for evaluations; (3) systematic data retrieval; (4) uniform measurements; and (5) consistent documentation.

Use of the manual will necessitate a combination of structured analysis with qualified professional judgment; judgment that assumes a degree of experience in impact assessment. Documentation of judgmental decisions is required within the methodology to insure an understanding of the subjective factors influencing the evaluations.

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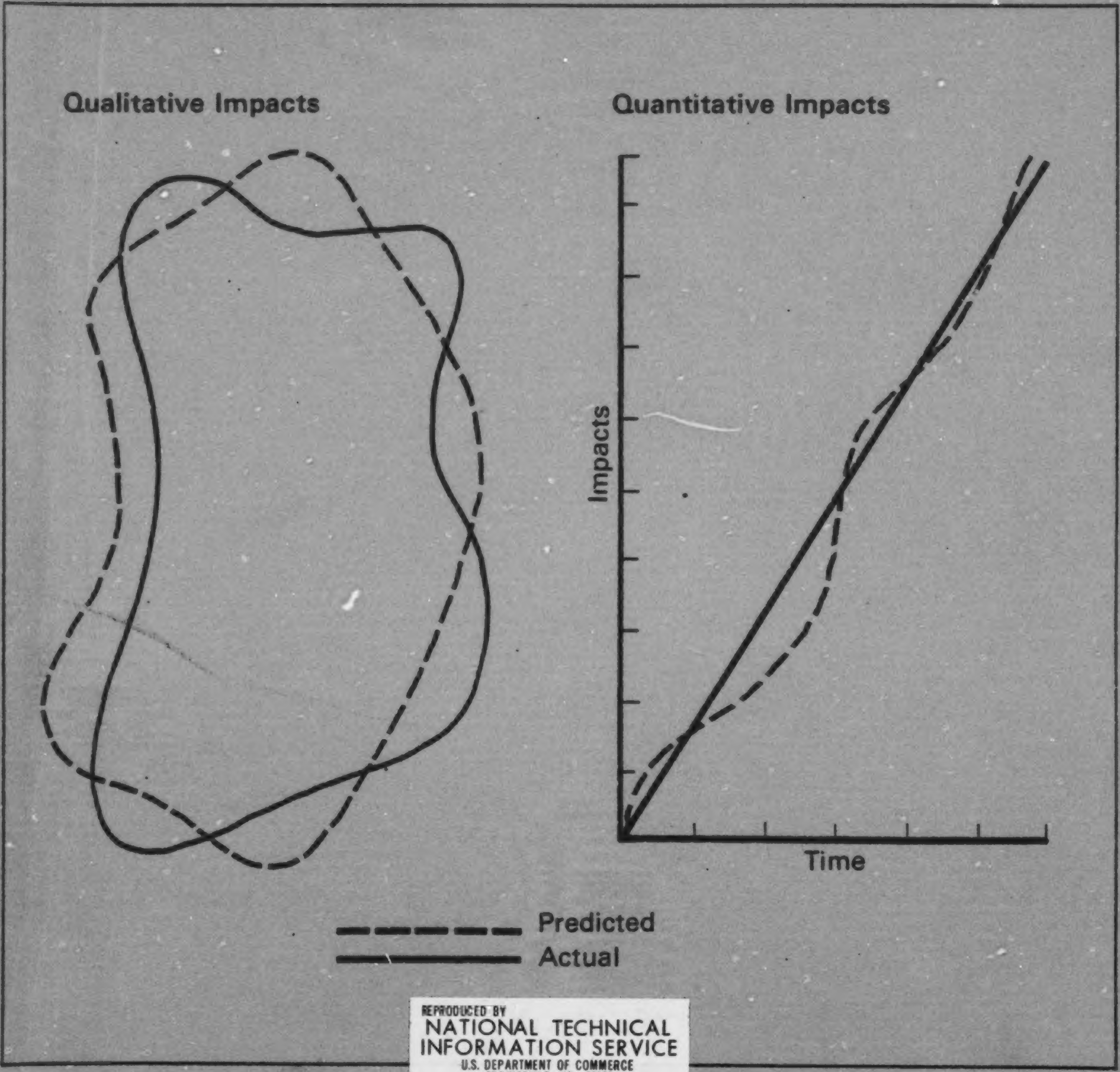

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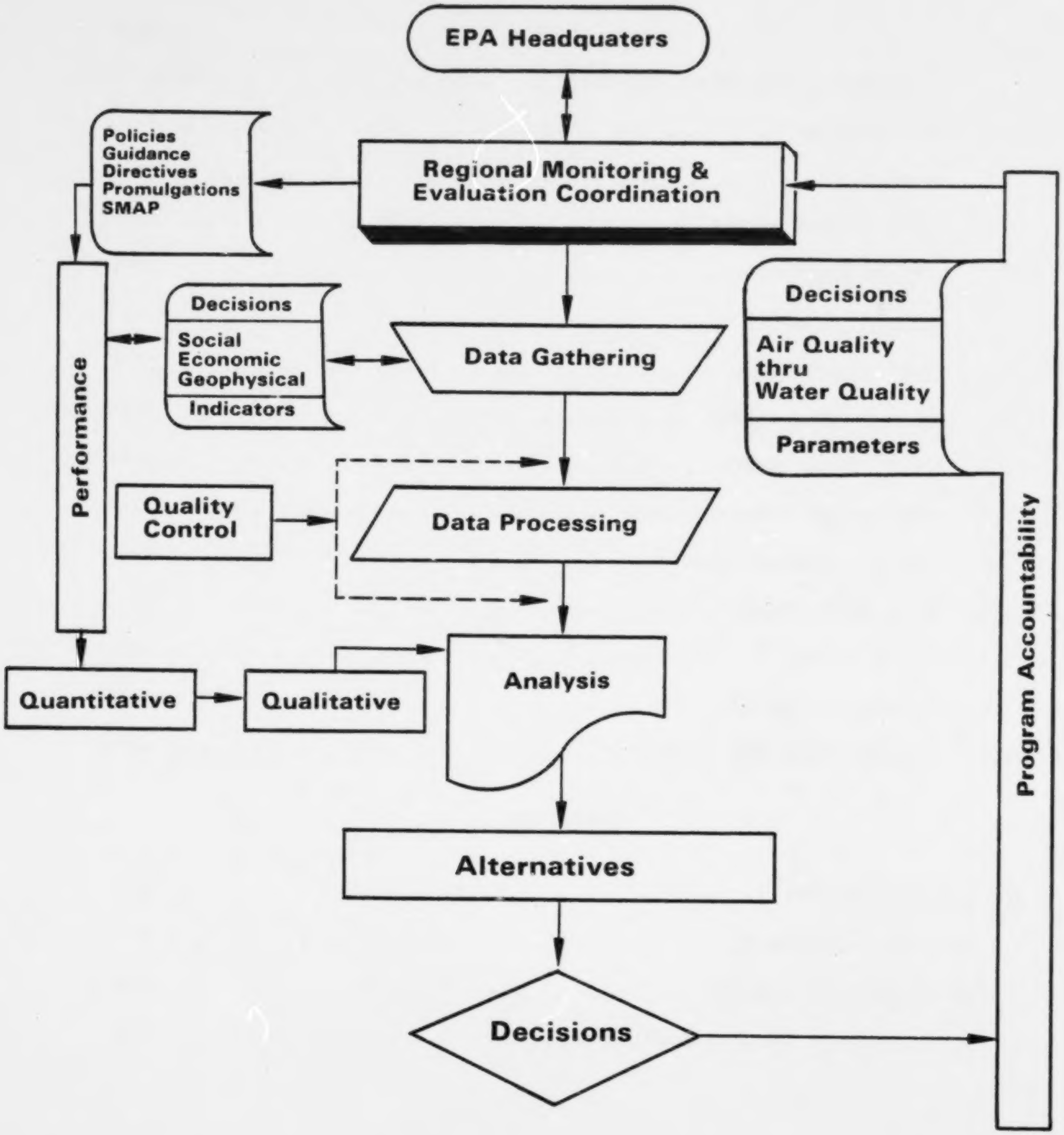
EPA Headquaters
Policies
Guidance
Directives
Promulgations
SMAP
Regional Monitoring & Evaluation Coordination
Decisions
Social
Economic
Geophysical
Indicators
Data Gathering
Decisions
Air Quality
thru
Water Quality
Parameters
Performance
Quality Control
Data Processing
Quantitative
Qualitative
Analysis
Alternatives
Decisions
Program Accountability

CHAPTER I

INTRODUCTION

The promulgation of the National Environmental Policy Act (NEPA) in 1969 established a process by which federal agencies were required to assess the environmental impacts of their actions. With the passage of P.L. 92-500 in 1972, also known as the Federal Water Pollution Control Act (FWPCA) and amendments, a detailed facilities planning process was defined as part of the Construction Grants program. The Environmental Protection Agency's environmental review responsibilities of individual facilities plans are defined in 40 CFR Part 6 (Implementation of Procedures on the National Environmental Policy Act). Additional policy and guidance documents have been issued which provide technical guidance regarding the scope of EPA's environmental review process.

Throughout the 1970's, environmental impact assessment methodologies were refined, areas of concern expanded and environmental data bases accumulated. Also, the intensiveness with which certain environmental issues were evaluated changed with the passage of specific federal legislation or requirements such as those relating to wetlands and floodplains. Secondary impacts, those associated with the development stimulated by a Construction Grants project (but not the project itself), became an important issue.

Beginning in 1978, EPA began delegation, a process by which many of the administrative functions of the Construction Grants program were turned over to State agencies. Although EPA established its role as the oversight agency of the Construction Grants program, many of its direct environmental review functions were delegated to the States. The Agency has always maintained final NEPA authority to determine whether an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FNSI) should be prepared. However, in many cases where facilities plan review has been delegated, detailed reviews are accomplished at the State level where a preliminary environmental assessment (EA) is prepared and EPA's responsibility is carried out based only upon its review of this often brief EA. Furthermore, the use of categorical exclusions and the elimination of Step 1 and 2 grants reflect the evolution of EPA activities from direct scrutiny to oversight responsibilities on Construction Grants projects.

As an oversight agency responsible for NEPA decisions, EPA must periodically determine the effectiveness of the Construction Grants program and NEPA in restoring the quality of the nations' waters and in protecting the environment. The primary purpose of this manual is to present an objective methodology for evaluating the accuracy of predicted environmental effects resulting from Construction Grants projects. A methodology was designed such that the accuracy of impacts predicted for a single project, group of projects or an entire program can be evaluated.

A major result of this evaluation process will be to propose changes to the existing environmental review process to increase the effectiveness and responsiveness to environmental issues. By fulfillment of this objective, it is intended that EPA will increase the effectiveness of the NEPA process through the coming decade. This manual has been developed by EPA, Region V; however, the manual can be utilized for an analysis of completed Construction Grants projects throughout the nation.

CHAPTER II

METHODOLOGY

Introduction

A detailed methodology has been developed which determines the accuracy with which planning and environmental review documents (NEPA documents) assessed predicted environmental effects of Construction Grants projects. When the term "NEPA documents" is used in this manual, it refers not only to the Environmental Impact Statement (EIS), but also to the Environmental Information Document (EID)/Environmental Assessment (EA), facilities plan, Draft EIS, and other associated documents. Based upon the continued use of the manual, it is EPA's intent to propose changes to the NEPA review process to increase its effectiveness.

The process of environmental impact analysis is not an exact science. Levels of uncertainty ranging from low to very high are associated with many of the analytical steps. Thus, the term "accuracy", as it is used above and throughout this document, must be defined in its most general sense.

A single methodology was developed to evaluate the entire spectrum of Construction Grants projects. In general, evaluations are possible for three types of situations: single project; aggregate of projects; and an entire program. Specific components of the methodology include the use of: (1) a simple set of procedures; (2) a standard set of issues for evaluations; (3) systematic data retrieval; (4) uniform measurements; and (5) consistent documentation.

Effective use of this manual is predicated upon the identification and clear definition of the program elements to be analyzed. This will provide the reviewer with an additional level of understanding necessary for effective utilization of the manual. If the definition of program elements is nonspecific or ambiguous, effective utilization of the manual is not likely.

Once the program elements have been identified, a simple procedure is presented in order that a sample of projects can be selected for application of the methodology. An Evaluation Form (Figure I) has been developed to standardize documentation of the results of the evaluations. Another critical aspect to the effective use of this manual is the ability to identify, gather and manage data. Appendices A and B, Data Base Report and Data Base Management, are included to assist the user in identifying readily available data bases and to provide the user with a system for managing that data.

The majority of this manual consists of specific issue chapters. Each chapter contains a specific methodology for evaluating one particular issue and is presented in a uniform format which includes the following components: introduction; data required; method; specific evaluation steps; and products required. Appendix C presents an annotated bibliography in order to provide the user with additional sources of information for evaluating specific environmental issues. Depending upon the evaluation goals, a few or several or all of the issue chapters may be used. The Interrelated/Other Issues chapter must be included in all applications of this evaluation methodology.

Use of the manual will necessitate a combination of structured analysis with qualified professional judgment; judgment that assumes a degree of experience in impact assessment. Reliance upon judgment has been minimized to maintain as much objectivity as possible. Documentation of judgmental decisions is required within the methodology to insure an understanding of the subjective factors influencing the evaluations.

Sample Identification

Prior to the implementation of the methodology, the reason for the analysis should be briefly defined. The more accurate a definition, the easier it will be to select a representative sample of projects to be evaluated. Items such as issues, location and time span are valuable components of the definition. The common objective for every evaluation using this manual is to answer the question: "How accurate were the impacts of a Construction Grants project(s) predicted?" Several examples of program elements to be evaluated might include:

- An evaluation of all construction grants projects completed per facility code within Region V between 1972 and 1984;
- An evaluation of all projects completed within one state such as Indiana;
- An evaluation of the accuracy of predicting impacts to wetlands and floodplains for all projects completed within Region V;
- An evaluation of the St. Cloud, Minnesota, project; and
- An evaluation of all completed projects within Region V only involving the construction of interceptors.

Once the reason for the analysis has been defined, a total list of projects meeting those conditions must be identified. Sources of project identification include EPA's Grants Information Control System (GICS), regional personnel such as section chiefs and regional specialists; and permit records. For several of the examples identified above, the following information was generated using these data sources:

- Evaluation of all construction grants projects completed per facility code within Region V between 1972 and 1984 = 693; derived from GICS;
- Evaluation of completed projects affecting wetlands and floodplains within Region V between 1972 and 1984 = 160 projects; derived from GICS and manual search of EPA Region V EIS Section "EA Log" file in 1984.

If the list of projects generated from the above sources is small, it may be economically feasible to include all of the projects in the analysis. However, it will more often be the case that a large number of projects will be identified as the example above illustrates. In this case, a second step is required to generate a representative sample of the total set of projects identified. Several sampling strategies exist to accomplish this goal. Random sampling is the easiest method and should provide for very acceptable results. However, if the reviewer has certain knowledge concerning specific kinds of projects then a stratified sampling procedure may be in order. Specific strata identified might correspond to location, size, cost and type of project. The advantage of stratifying over random sampling is that a smaller number of projects might be selected, but due to the efficiency of this method, the accuracy of parameter estimates will be equivalent.

Generally, the reviewer should use a random sampling strategy, i.e., number each project, then use a random number table to select the sample. The sample size should be based on the reviewer's available time, budget, personnel resources, and the acceptable level of sampling error. If a more complicated design is in order, the reviewer should consult with a statistician.

Specific Methodology

Specific methodologies have been developed to assess predicted and actual impacts for 11 environmental issues. In addition, a chapter on Interrelated Issues is included to assess unforeseen/unanticipated impacts and the effects of mitigating measures. Each of the issue chapters (III-XIV) is arranged in a uniform fashion to facilitate their use. The following sections are contained in each of the issues chapters. General information is provided which describes the intent of each section and an overview of the issue specific methodology.

Introduction: An introduction precedes each issue chapter in order to provide a general technical overview of the subject.

Data Required: Specific data required for the evaluation of each issue is included in this section. It is important to note that a significant amount of this data were originally generated by engineering consulting firms and not Federal or State agencies in the preparation of Facilities Plans and environmental information documents. Each evaluation requires that uniform information be available to identify the Construction Grants project. This information should be retrieved from EPA's Grants Information Control System (GICS) and will insure proper identification of the project. Appendix A describes numerous sources of computerized and manual data bases. A data base management system is presented in Appendix B. These appendices should be reviewed prior to the implementation of a project/program review. It also is suggested that prior to undertaking any search for information, the reviewer examine the Directory of Environmental Data Bases for Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin (EPA, Region V, 1984).

Method: A general methodology for evaluating one specific issue is presented. Additional guidance is presented to assist with the integration of quantitative information and judgmental factors.

Specific Evaluation Steps: Detailed steps to be followed for conducting issue specific methodologies are provided. Each of the steps are linked to facilitate completion of the Evaluation Form (Figure I). In general, the specific methodologies are provided in a sequence of five logical steps. Several of these steps may be combined in the issue chapters.

1. Identify Appropriate Data Base(s):
   The reviewer must first determine which issues from the NEPA document are to be evaluated. The Issues chapters (III through XIV) provide guidance for the review of typical issues. The reviewer must be receptive to unexpected, overlooked, or unpredicted impacts (Chapter XIV). Data bases appropriate to these issues must be identified and located. The relevant Issues chapter(s) and the Data Base Report (Appendix A) provide guidance for this step. Generally, preference should be given to EPA maintained data bases, then other machine readable files, and finally, manual files. The preference for EPA-maintained data bases relates to their being the most cost-effective and easy to access. Also, the accuracy and the updating procedures are easily documented. Other machine-readable files may involve user fees and are more labor intensive to access. Manual files are substantially more labor intensive to use and may require extensive searching to locate the file; however, there may be various project issues where this represents the best data available. The selected data base(s) is entered in the Evaluation Forms for each relevant issue.

2. Retrieve the Baseline Values for the Parameters:
   A set of parameters are used to define each issue. Parameters must meet two important criteria; they must be sensitive to the project activities, such that they will indicate the impacts of the project; and they must be amenable to analysis, with baseline and available current data. Each of the Issues chapters and the Data Base Report (Appendix A) provide guidance in the selection of parameters.

   Once suitable parameters have been identified, the data base(s) will be searched to locate the baseline values for these parameters. The baseline data must be taken as the most recent entry in the data base prior to the publication date of the NEPA document, thus, insuring that the proposed action does not influence the baseline. If the parameter is subject to considerable natural variation, and if the study will use statistical testing to evaluate the impact predictions, several data points prior to the NEPA documents publication date must be retrieved. Information logged on the Evaluation Form includes: parameters selected; baseline values; date of data; and the source of the NEPA documents.

3. Impact Predictions from the NEPA Document:

Generally, impact predictions are found in either the Impact Analysis section or in the Alternatives Analysis section of the NEPA document. The most important consideration in deriving the impact prediction is to determine the original author's intended perception of the magnitude of the impact(s) and the relative importance of the specific issue.

The prediction of impact will take one of three forms: quantitative absolute, quantitative relative or qualitative. A quantitative absolute prediction describes the value of the parameter at some future date, for example:

> "total phosphorous in the receiving water = 30 ppm after installation of project improvements,"
>
> "service area population = 18,000 in year 1990,"
>
> "300 acres of land reclaimed by sludge application in 1995."

A quantitative relative prediction describes the magnitude of the change in the parameter expected by some future date, or the rate of change in the parameter; for example:

> "regional population will increase at a rate of about 15% per annum."

A qualitative prediction describes the expected change in general terms, without specifying the value or magnitude of the change, for example:

> "downstream water quality will improve, during construction there will be a slight increase in siltation."

Professional judgment is required to determine the quality of resource data and to estimate magnitudes based on qualifiers. It is essential that these judgments be fully documented including any assumptions employed. If a particular issue is not addressed in the NEPA document, the reviewer should assume, unless otherwise indicated, that the author implied there would be no impact relevant to the issue.

In the case when "no impact" is predicted, it is understood that the parameters describing the impact will change by zero units. Therefore, if the values of parameters in question are compared before, after or during the project, they would generally remain the same. Note that "no significant impact" implies that some degree of impact may, in fact, occur, but that the degree or magnitude of the impact attributable to the project can be mitigated, if necessary, for environmentally acceptable results.

4. Retrieve the Current Values for the Parameters:
This step is a repetition of Step (2) except that the data to be retrieved are to be the most recent prior to the date of the evaluation study and after the project has been constructed, not necessarily operational. It should be noted that short-term impacts that occur should be included, but may be difficult to detect after the construction is complete. It may be necessary to conduct field surveys in order to obtain current values.

5. Evaluate the NEPA Predictions:
In this step the reviewer determines whether or not there is agreement between predicted impacts and current values of the parameter meeting the original author's statement of what impacts were expected. This step is documented by a narrative statement along with the reviewer's conclusions concerning the accuracy of the impact predictions in the NEPA document. Results can be quantified (as a percentage) or qualified in the narrative.

Products Required: The products required from the implementation of the methodology include a fully completed Evaluation Form(s) and a narrative statement which documents judgments and any other implications of the procedures.

NEPA Review Process

It is the intent of this manual to enable EPA management personnel to propose changes to the NEPA review process to increase its effectiveness. Changes to the process will only become apparent after continued use of the manual through a significant number of program evaluations representative of the entire Construction Grants program within the United States. Recent changes in the Construction Grants program which may have an impact on the effectiveness of NEPA include the increased role of state agencies, the use of categorical exclusions from NEPA compliance requirements and the elimination of Step 1 and 2 grants. As a result of the examination of NEPA effectiveness future changes to the NEPA process might include minimal experience and educational requirements for NEPA reviewers; changes in federal/state responsibilities; and changes to 40 CFR Part 6 (Implementation of Procedures on the National Environmental Policy Act).

EVALUATION FORM INSTRUCTIONS

1. Enter the project name.
2. Enter the Needs (facility) Number (32), NPDES (Permit) number (C2), and complete Grant Number to include Program Code (02), Grant Number (01), Type (04), Sequence (54), and Amendment (03). (GICS transaction numbers are shown in parentheses.)
3. Enter the date of the NEPA document.
4. Check the document type. More than one type of document may be the subject of the review, e.g., amended EID's, EA's, etc.
5. Enter location in terms suitable to the issue(s) being evaluated, i.e., political jurisdiction for population, river basin and segment for surface water quality. Include, if available, the latitude and longitude of the vertices of a polygon defining the area concerned.
6. Enter the issue (e.g., socioeconomic) and parameter (e.g., population) evaluated as identified in Chapters III through XIV.
7. Indicate the type of impact.
8. Provide a short description of the predicted impact as presented in the NEPA document. Maximum length, 288 characters including blank spaces.
9. Enter the source of data used in the development of the NEPA document's project baseline (#10).
10. Enter the date of the project baseline. Provide the baseline level of the parameter (e.g., 1970 population, 12,000).
11. Provide the prediction of the parameter as projected or forecasted for the end of the project life (include date) as expressed in the NEPA document. (e.g., 1990 population, 14,500).
12. Based on the baseline data and predictions in #10 and #11, respectively, extrapolate/interpolate the current or actual values of the parameter as it should be at the time of study if the predicted impact is to be reached by the end of the project life. (e.g., 1970 baseline-population; 12,000, 1990 projected-population; 14,500, therefore, 1984 time-of-study population should be 13,750), using a straight line interpolation. Please note assumptions attributed for and against curved and/or straight line projections.
13. Provide a brief description of the current level of the parameter based on your evaluation as per the appropriate issue chapter.
14. Enter the title of the data base used or technique used to identify the current level in #13.

EVALUATION FORM INSTRUCTIONS
(Continued)

15. Provide your summary of the accuracy of the prediction. The first two spaces should be the code described below.

    NA = Not applicable/not an issue.
    +1 = No significant difference or impact was in fact better than expected or mitigated as planned.
    -1 = Significant difference. This parameter should be examined further. (Red flag.)
    00 = Could not be evaluated.

16. Enter the date and title of the regulations governing this parameter which were in effect during the baseline year. If the regulations have changed, also fill in the date and title of today's regulations. Use bibliographic format (author, title, publisher and date). If there is no author, leave first six spaces blank. Use code of Federal Regulations and/or Executive Order number where possible.

17. & 18. Initial and date form.

19. Enter the title of any narrative report or field investigation report.

20. Indicate where any narrative report is permanently filed (include data base and file name, etc.), e.g., division, section, unit.

EVALUATION FORM

1. Project Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

2. Needs (Facility No.) ☐☐☐☐☐☐☐☐☐☐☐ NPDES No. ☐☐☐☐☐☐☐☐☐☐☐.☐☐☐

Grant No. ☐☐☐☐☐☐☐☐ ☐☐☐☐

3. Date of Document: Year ☐☐☐ Month ☐☐ Day ☐☐

4. Type of Document: a. EIS ☐ b. EA ☐ c. EID ☐ d. Facilities Plan ☐

e. Negative Dec. ☐ f. FNSI ☐

5. Location: (Latitude/Longitude)(degree/minute/second) or Political Jurisdiction:

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☐☐ -☐☐ -☐☐ N- ☐☐ -☐☐ -☐☐ W ☐☐ -☐☐ -☐☐ N- ☐☐ -☐☐ -☐☐ W

☐☐ -☐☐ -☐☐ N- ☐☐ -☐☐ -☐☐ W ☐☐ -☐☐ -☐☐ N- ☐☐ -☐☐ -☐☐ W

6. Issue: ☐☐☐☐☐☐☐☐☐☐☐ Parameter: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

7. Type of Impact: ☐ (1 = Quantitative) (2 = Qualitative)

8. Prediction: (limited to 288 alpha-numeric and blank character spaces)

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9. Source of NEPA Document Data: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

10. Baseline Conditions: Year ☐☐☐ (limited to 288 alpha-numeric and blank character spaces)

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11. Predicted for end of planning period: Year ☐☐☐ (limited to 288 alpha-numeric and blank character spaces)

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EVALUATION FORM

12. Predicted for Current Year: Year (limited to 288 alpha-numeric and blank character spaces)

13. Actual Current Conditions: Year (limited to 288 alpha-numeric and blank character spaces)

14. Data Base:

15. Summary: (Code) (limited to 360 alpha-numeric and blank character spaces)

16. Regulations in Effect:

A. Baseline:
   Today:
B. Baseline:
   Today:
C. Baseline:
   Today:

17. Reviewer:
18. Date of Review: Year Month Day
19. Title of Narrative Report:
20. Location of Narrative Report:

CHAPTER III

WATER QUALITY ISSUES

Introduction

The Water Pollution Control Act of 1972 redirected the Construction Grants program in order to "restore the nation's waterways to fishable, swimmable quality". Since this manual was developed to provide guidance in the assessment of actual versus predicted impacts of Construction Grants projects, it is appropriate that the foremost impact issue presented be water quality.

Water quality impacts of a Construction Grants project may occur during building, as well as during operation of the facilities. They may affect groundwater as well as surface water and may result directly from the construction and operation of the project or indirectly from the development which the project serves and/or allows to occur on previously undeveloped land.

Water quality impacts resulting from Construction Grants projects are both beneficial and adverse. Beneficial impacts are generally associated with the operation of the facilities by elimination of the pollution sources and/or improvement in the quality of existing effluent discharges to surface or groundwater. Adverse impacts may be associated with the building and operation of the facilities or the use and development of land served by the facilities. Examples of these are soil erosion and subsequent stream siltation; replacement of natural vegetation with cultivated species or impervious surfaces which change the quantity and quality of runoff and groundwater recharge to local streams; and upsets or malfunctions of the facilities caused by severe conditions or plant neglect resulting in the discharge of excessive pollutant loadings.

The objectives of the Construction Grants program, the Water Pollution Control Act and the Clean Water Act are to effect a net beneficial impact on water quality such that the fishable, swimmable use standards are met. Other legislations including the Safe Drinking Water Act are concerned with preserving and enhancing the quality of groundwater such that water is suitable for human consumption.

The purpose of this chapter is to outline a method by which water quality impacts predicted in the NEPA documents of one or more projects can be evaluated for accuracy against the actual impacts which have occurred. Thus, the method is applicable only to completed Construction Grants projects upon which NEPA documents were developed in the planning stages. Since impacts from construction of facilities are largely mitigatable, short-term building related impacts on water quality are not addressed. Long-term impacts due to construction and operation of the plant or development served by the plant are addressed in this chapter.

Before proceeding further, the reviewer is cautioned that a very subtle distinction exists between the subject of this chapter and other related water quality issues which are beyond the purview of this manual. For example, the purpose of this chapter is not to determine whether the completed facilities are in compliance with their operating permits. This is a function of the State and the USEPA Compliance Sections and is done by evaluating reports of plant effluent quality against the limitations set forth in the applicable NDPES permits for a specific set of effluent parameters. Likewise, the purpose is not to determine if the applicable stream or groundwater quality standards are being achieved. This is a function of the state and the USEPA Water Quality Surveillance Sections or Groundwater Sections and is carried out by evaluating sampling data against a set of state or Federal water quality standards.

The purpose of this chapter is to assess the accuracy of water quality impacts predicted for Construction Grants projects in NEPA documents. This is done by evaluating the predicted impacts on water quality against the actual changes which occurred.

Since the impacts on groundwater, the circumstances under which they would occur, and the methods used to assess groundwater quality are markedly different from those of surface waters; these two aspects of water quality will be addressed separately throughout the remainder of this chapter.

SURFACE WATERS

Data Required

The prediction of impacts to surface water quality presented in NEPA documents will take any of three forms. A quantitative absolute prediction states a specific value for some future time for each parameter used in the assessment of impact. For example, "Following plant start-up and for the remainder of the planning period, stream dissolved oxygen will meet or exceed 5.0 mg/1, except during some periods of rainfall or snowmelt". A quantitative relative prediction states the impact in terms of the relative amount by which a parameter is expected to change. For example, "Following plant construction, the 100-year floodplain will be expanded by less than 1 percent". Finally, a qualitative prediction states the direction of impact (i.e., beneficial, adverse or no impact), but does not attempt to define the magnitude of change expected. For example, "Implementation of preferred alternative will result in improved water quality in terms of higher dissolved oxygen and lower pollutant concentrations".

The primary impacts on surface water quality from Construction Grants projects are defined in NEPA documents using specific chemical, physical, and biological parameters. Since treatment plant design is based on the achievement of specific effluent limitations set forth in the NDPES permit, these same or directly related parameters are generally used to describe the resultant water quality impacts.

In general, NEPA documents discuss long-term water quality impacts only in relation to the impact of the operation of the proposed facilities. Since this evaluation does not distinguish between impacts directly resulting from plant operation and those long-term impacts caused by plant construction or land use changes, a substantial margin of error between the predicted and the actual is possible.

The predicted impacts to surface water quality should be derived from the NEPA documents. If impacts are stated in quantitative relative or qualitative terms, then the baseline upon which to relate the impact should also be derived or determined. This baseline condition may take the form of a set of "before project" water quality parameters, a set of "current upstream" water quality parameters, or may be related to a critical or design low flow condition (e.g., Q7/10).

If the prediction was based on a modeling effort, then the model baseline water quality and the assumptions affecting impact prediction should be understood. It may also be necessary to obtain the water quality data used to support the model.

Since many Construction Grants projects involve the elimination of pollutant sources over a large planning area, water quality data for affected waters other than the project receiving water should be collected to assess impact.

Current or "after project" water quality data regarding the predicted impact parameters must also be obtained. One of the most comprehensive sources of such data is STORET. The reviewer should request an inventory summary of STORET data for the study area. The study area can be defined by a polygon described in terms of latitude and longitude for each corner. The inventory summary will identify all monitoring stations in the study area, the parameters monitored, the number of samples taken, the period of record, and some summary statistics. Based on this, the reviewer can identify appropriate stations, parameters, time frame, and other characteristics desired for a full data retrieval.

Other sources of "before" and "after" project water quality data include USGS, U.S. Fish and Wildlife, U.S. Forest Service, National Park Service, various state departments associated with water resources, regional and local planning agencies, and local water and sewerage departments. Data on predicted water quality impacts, however, can only be derived from the NEPA documents.

Method

The method consists of five basic steps: (1) determination of baseline ("before" project) water quality, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) water quality data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction.

The most crucial step in the method will be the comparison of actual impacts with predicted impacts in the assessment of accuracy. The reviewer should be aware that water quality data, particularly chemical, physical and biological are generally obtained as grab samples or composite samples which represent conditions at a specific location and point in time. Water quality characteristics can and do change rapidly depending upon weather conditions, location, season, time of day, temperature, and flow. The reviewer should exercise caution to insure that data are reasonably comparable.

Specific Steps

For each water quality parameter used in the prediction of impacts, an evaluation form, as shown in Chapter II, should be completed.

1. Using the NEPA documents, define the predicted water quality impacts of the project. Given the objectives of the Construction Grants program, an enhancement of water quality should be predicted in all cases. If possible, describe the predicted improvement in quantifiable terms such as absolute or relative concentrations of DO, BOD, SS, nutrients, metals, organics, chlorophyll "a", or fecal coliform bacteria. In any event, the conclusions of the NEPA document predictive technique should be reiterated. If modeling was used to justify the project, the water quality response predicted by the model should be described (e.g., improved DO concentration, reduced pollutant concentrations, reduced spatial or temporal extent of water quality problems). If a loading analysis was used, summarize the impact predicted for the loading reduction in terms of improved water quality. If no analysis was used to justify the project but rather a state policy (e.g, 3 to 1 dilution of effluent at Q7/10), obtain from the document or calculate the expected parameter concentration for the given critical flow condition.

2. From the NEPA documents or other appropriate sources, define the baseline ("before" project) water quality of the planning area using the same or comparable parameters as used in the prediction of impacts. For chemical, physical and biological parameters, the reviewer should insure comparability to the predicted values relative to flow, temperature, season, location, etc., as discussed above.

   Compile the baseline water quality by location. Identify data and parameters that indicate a water quality problem (e.g., fish population and stream classification) when compared to applicable standards. If possible, define the spatial and temporal extent of the problems.

3. From STORET or other appropriate sources, determine the current or "after" project water quality of the planning area using the same or comparable parameters as used in the prediction of impacts. Again, comparability of data must be evaluated by the reviewer.

Compile the current water quality data by location.

4. Evaluate the accuracy of the NEPA water quality predictions by comparing the predictions to the actual data. If the predictions were made in terms of quantitative absolute values (QAV), the difference between the predicted and actual values can be defined in terms of a percentage accuracy as follows:

$$\text{QAV: } \frac{\text{Actual Value}}{\text{Predicted Value}} = \text{Comparative Value}$$

If the predictions were made in terms of quantitative relative values (QRV), the difference between the predicted relative value and the actual relative value can be defined in terms of a percentage accuracy as follows:

$$\text{QRV: } \frac{\text{Actual Value (Mean)}}{\text{Lowest Predicted Value}} \text{ to } \frac{\text{Actual Value (Mean)}}{\text{Highest Predicted Value}} = \begin{array}{c}\text{Comparative} \\ \text{Range of Values}\end{array}$$

Finally, if the predictions were qualitative, the reviewer will be required to make a professional judgment concerning the accuracy of the prediction relative to the actual "after" project data.

In all cases, the final assessment of accuracy should be tempered by the reviewer's awareness of the relative margin of error or level of uncertainty associated with the "before" and "after" project data employed. This is a qualitative judgment on the part of the reviewer which requires a kind of mental sensitivity analysis. The reviewer should attempt to answer in a qualitative manner questions regarding the comparability of "before" and "after" data, the accuracy of the sampling and analysis, the potential impact of other non-project related pollutant sources, the existence of other data which tends to either support or conflict with the reviewer's findings, etc. From this exercise, the reviewer can formulate a professional judgment on the level of uncertainty of the analysis. This should be expressed in terms of low to very high. A low level of uncertainty would be a situation where sampling locations, sampling technique, season and weather conditions, parameters tested, and laboratories were the same for the "before" and "after" project data. A very high level of uncertainty might be indicatd where one or all of these factors were different between the "before" and "after" project data.

Products Required

Evaluation forms must be completed for each parameter/location to be used in the assessment of predicted impact accuracy. A narrative explanation of the procedual steps taken in the evaluation, including all assumptions, judgments and deviations made by the reviewer should also be prepared.

GROUNDWATER

Data Required

The prediction of impacts to groundwater quality presented in the NEPA documents of Construction Grant projects may also take the form of quantitative absolute, quantitative relative or qualitative predictions as defined under Surface Water. Unlike surface water quality issues which are paramount in virtually all Construction Grants NEPA documents, impacts to groundwater as an issue, generally, only occur in cases where; 1) the project was justified on the basis that a substantial groundwater pollution source (e.g., malfunctioning on-site systems) would be eliminated, or 2) the potential for significant adverse impact to groundwater quality exists (e.g., wastewater or sludge land application or sludge landfill).

The predicted impacts to groundwater should be derived from the NEPA documents. If impacts are stated in relative or qualitative terms, then the baseline upon which to relate the impact should also be derived or determined. Baseline conditions may take the form of a "before" project groundwater quality characterization based on well sampling in the project area or may simply consist of quality characteristics "typical" for the aquifer.

If the prediction was based on a geohydrologic model, the model input data, the baseline water quality and the assumptions affecting the model's predictive capabilities should be understood.

The primary impacts on groundwater quality from Construction Grants projects are defined in terms of specific chemical, physical and biological parameters. Typically, local and state health departments routinely test new or existing domestic wells for total coliform bacteria (TC) and possibly nitrates (NO_3) in some areas; thus, data from this source is generally limited to these parameters. Where groundwater contamination or the potential for contamination exists, tests for several other constituents may have been conducted to serve as a baseline for a monitoring program or to determine the existence of contamination. Constituents which may be of concern in Construction Grants projects include: BOD, COD, Total Nitrogen, Nitrate Nitrogen, Total Phosphorus, Total Dissolved Solids, pH, Alkalinity, Sodium Absorption Ratio (SAR), Total Coliform, various metals, cyanide, and organic compounds.

The current or "after project" groundwater quality data regarding the predicted impact parameters must also be obtained by the reviewer. In projects where groundwater quality is at risk, the best source of this information would be from an on-going monitoring program associated with the operation of the facilities. If no monitoring program has been conducted, requests should be made from the county and state health departments and regional planning agencies regarding any routine groundwater testing in the area or complaints of contaminated wells. If contaminated well data does exist in health department files for the project's vicinity, a project related origin of the contaminants or a project related impact of changing geohydrology must be documented before this data can be used to assess the accuracy of impact analysis.

In projects where groundwater quality is expected to be enhanced, the best source of data would be local and state health departments. Quantitative data would require actual test results, while a qualitative impact might be verified by comparing the annual numbers of contaminated wells discovered in the project area for the "before" and "after" project condition.

Method

As with surface water, the groundwater methodology consists of five basic steps: (1) determination of baseline ("before" project) water quality, (2) compilation of predicted impacts, (3) determination of the actual impacts based on current ("after" project) groundwater quality data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction.

The most crucial step in the method will be the comparison of actual impacts to predicted impacts in the assessment of accuracy. The reviewer should be aware that the travel time of constituents in groundwaters is slow and mixing is not significant when compared to surface waters. A sample taken from a well may reflect surface inputs from several years before sampling and may not necessarily be associated with the operation of the facilities. Also, groundwater flow dynamics and the factors which influence quality are much less defined than for surface waters, thus, a substantial margin of error between the predicted and actual impacts may exist. For this reason, on-going groundwater monitoring programs are often required where there is a risk of contamination from the operation of a project. Where quantitative impacts are defined, the reviewer should insure that the "after" project data are reasonably comparable to the baseline data in terms of location and depth. Ideally, "before" and "after" samples from the same set of wells should be evaluated.

Specific Steps

For each groundwater quality parameter used in the prediction of impacts, an evaluation form, as shown in Chapter II, should be completed.

1. Using the NEPA documents, define the predicted groundwater quality impacts of the project. These could range from substantial enhancement to severe degradation. If possible, describe the predicted improvement in quantifiable terms such as absolute or relative constituent concentrations. The conclusions of the NEPA document predictive technique should be reiterated. If modeling was used to predict the impacts, the water quality response predicted by the model should be described. If a loading analysis was used (e.g., nitrogen loadings for a land application systems), summarize the predicted impact in terms of groundwater constituent concentrations.

2. From the NEPA documents or other appropriate sources, define the baseline ("before" project) groundwater quality of the project area using the same or comparable parameters as used in the predictions of impacts. For chemical, physical and biological parameters, the reviewer should insure comparability to the predicted values relative to well locations and depth.

   Compile the baseline groundwater quality data by location. Identify data and parameters that can be used to indicate a groundwater impact.

3. From appropriate sources, determine the current or "after" project water quality of the project area using the same or comparable parameters as used in the prediction of impacts. Again, comparability of data must be evaluated by the reviewer.

   Compile the current groundwater quality data by location and depth.

4. Evaluate the accuracy of the NEPA groundwater quality predictions by comparing them to the actual data. If the predictions were made in terms of quantitative absolute values (QAV), the difference between the predicted and actual values can be defined in terms of a percentage accuracy as follows:

$$\text{QAV: } \frac{\text{Actual Value}}{\text{Predicted Value}} = \text{Comparative Value}$$

   If the predictions were made in terms of quantitative relative values (QRV), the difference between the predicted range of relative values and the actual relative value can be defined in terms of a percentage accuracy as follows:

$$\text{QRV: } \frac{\text{Actual Value (Mean)}}{\text{Lowest Predicted Value}} \text{ to } \frac{\text{Actual Value (Mean)}}{\text{Highest Predicted Value}} = \text{Comparative Range of Values.}$$

   Finally, if the predictions were qualitative, the reviewer will be required to make a professional judgment concerning the accuracy of the prediction relative to the actual "after" project data.

In all cases, the final assessment of accuracy should be tempered by the reviewer's awareness of the relative margin of error or level of uncertainty associated with the "before" and "after" project data employed. This is a qualitative judgment on the part of the reviewer which requires a kind of mental sensitivity analysis. The reviewer should attempt to answer in a qualitative manner questions regarding the comparability of "before" and "after" data, the accuracy of the sampling and analysis, the potential impact of other non-project related pollutant sources, the existence of other data which tends to either support or conflict with the reviewer's findings, etc. From this exercise, the reviewer can formulate a professional judgment on the level of uncertainty of the analysis. This should be expressed in terms of low to very high. A low level of uncertainty would be a situation where sampling wells, technique, parameters tested, and laboratories were the same for the "before" and "after" project data. A very high level of uncertainty might be indicatd where one or all of these factors were different between the "before" and "after" project data.

Products Required

Evaluation forms must be completed for each parameter/location to be used in the assessment of predicted impact accuracy. A narrative explanation of the procedual steps taken in the evaluation, including all assumptions, judgments, and deviations made by the reviewer should also be prepared.

CHAPTER IV

WETLAND ISSUES

Introduction

Wetland areas are protected under several Federal statutes, an Executive Order and various Agency regulations. The primary directive was established in Executive Order 11990, Protection of Wetlands (42 FR 26961; May 25, 1977). This order directs Federal agencies to insure that their actions do not diminish, but rather restore, preserve, and enhance the natural and beneficial values of wetlands. The order instructs Federal agencies to avoid new construction in wetlands except where no practicable alternative is available. In cases where such construction cannot be avoided, mitigative mesures must be adopted and special public notice given. Because of this regulatory emphasis and the environmental importance of these areas, it is essential to monitor the impact of Construction Grants projects on wetlands.

The purpose of this chapter is to provide a method by which the reviewer can evaluate the accuracy of predicted impacts on wetlands as addressed in NEPA documents. It provides a method of comparing those parameters identified as being the primary indicators of wetlands issues in a "before" and "after" project context. In general, the wetlands issues will require the use of manual data files. The data required will vary considerably, as the impacts tend to be site-specific.

The primary impacts of Construction Grants projects on wetlands are loss of wetland acreage in the project area and the degradation of wetlands caused by increased siltation rates, changes in nutrient loadings or direct construction related activities (e.g. loss of vegetation, channelization, etc.). Parameters which can be used to monitor direct impacts to wetlands may be divided into two groups; 1) those which reflect direct changes in wetlands as a whole, such as total acreage, alterations in shape, or changes in surface or subsurface drainage patterns, and 2) those which reflect direct changes to specific portions of the wetland, such as construction impacts on the extent and location of vegetation (e.g., cutting or removal of wooded species for pipeline routing).

Secondary impacts may also occur, including changes in wildlife populations, aquatic species, encroachment, changes in groundwater recharge or discharge, or groundwater quality. While the secondary impacts may dictate monitoring for change, these evaluations are addressed in other more appropriate chapters of this document. For example, encroachment is a growth related phenomenon and, therefore, would be addressed under the socioeconomic chapter of this document. Likewise, methodologies for determining the magnitude of change in wildlife habitat, aquatic species, groundwater recharge, etc. are discussed in their respective chapters.

Other issues surrounding wetlands may include compliance with various Federal, state or local regulations, as well as applicable mitigating measures. While the importance of these issues should not be downplayed, they are separate issues not to be confused with primary or secondary impacts. Any impacts resulting from regulatory issues will be reflected in the planning process and mitigating measures.

It should be noted that the method does not provide the reviewer with a system to predict wetlands impacts for a proposed project, but only for evaluating the accuracy of NEPA impact predictions relative to the actual impacts of the completed project.

Data Required

The data required include those data elements from state and/or local agencies or university studies which are pertinent to the site-specific predicted impacts.

Specific data required will be maps or aerial photos of the wetland(s) before and after the project. These maps/photos will be used to identify the boundaries of the wetlands, the total area (acreage) occupied by wetlands, drainage patterns, and the extent and location of vegetation within the wetlands. These data may be obtained through a number of sources and these will vary from project to project. In order to assist the reviewer in data search efforts, the following procedure is recommended for the procurement of wetlands data.

The reviewer should first examine the NEPA documents to identify original data sources and determine their applicability for use in conjunction with the methodology presented in this chapter. In many cases, the level of detail presented in NEPA document figures may not provide enough detailed data for analytical purposes. If NEPA document sources are insufficient, the following agencies and data sources should be contacted to determine if wetland data are available.

- USEPA EMSL (Environmental Monitoring and Support Laboratory).
- U.S. Fish & Wildlife Service and/or State DNR, Fish and Game Departments - Wetlands maps developed as part of the National Wetlands Survey.
- USGS - Aerial photography summary record system, index to aerial photography.
- USGS and/or State DNR, Fish & Game Departments and/or State EPA. Land use, land cover maps.
- Local agencies such as the local Planning Commission, County Engineer, District Offices of DNR, or Fish & Game or EPA.

- As a final resource, the reviewer may also utilize data presented in the local SCS Soil Surveys.

"Before" and "after" project data should be obtained from the same source if possible.

Method

The method consists of five basic steps; (1) determination of baseline ("before" project) conditions, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact predictions. The predicted impacts are derived solely from the NEPA document(s) for the project. The predictions may take any of three forms: quantitative absolute (or a statement of a specific value of the parameter at some future date), quantitative relative (or a statement of the relative amount by which the parameter is expected to change) or qualitative (a statement which gives an indication of how the parameter may change, without specifying the magnitude of the change). The actual impacts are derived by comparing data which represents the "before" and "after" project conditions. These data may be obtained from existing data files, or from field studies. The comparison of the two sets of data, the predictions and the actual impacts, and the evaluation of those results is the crux of the method.

The most crucial step in the evaluation method is the derivation of the predicted impacts. The reviewer must exercise care to insure that the derived impacts agree in spirit with the original author's intent as expressed in the NEPA documents. This will often require that the reviewer exercise judgement in interpreting the intent of qualifiers (such as slight, insignificant, substantial, etc.) commonly used in qualitative statements of predicted impacts. The only exception is the use of "no impact" or "undetectable" in a qualitative statement. "No impact" can always be taken as a quantitative relative statement that the magnitude of the change is zero. Similarly, the reviewer may reasonably infer that an "undetectable" impact is a quantitative relative prediction of a change of zero magnitude.

Specific Steps

For each wetland issue parameter used in the prediction of impacts, an evaluation form, as described in Chapter II, should be completed.

1. Using the NEPA documents, identify the counties and townships in which impacts are expected to occur. Most wetlands data are amendable to retrieval on the basis of the township involved, so every reasonable effort should be committed to determining the township(s) where the impacts will

occur. This information concerning location should be available in the "Description of the Effects of the Proposed Action" or the "Description of the Proposed Action" sections. In some cases, it will be in the "Analysis of Alternatives" section. Describe the baseline "before" project condition. Where NEPA document authors have omitted wetlands data, the reviewer may be required to independently develop baseline as well as post-project wetlands data.

2. Identify the predicted impacts. The NEPA document(s) must be reviewed to determine exactly what the author(s) predicted. The statements will generally be either qualitative or "no impact" type statements. "No impact" type statements are easily identified in NEPA documents and generally include a statement such as "wetlands will not be affected" or "no impacts to the wetlands are anticipated", for example:

> "Pursuant to 40 CFR Part 6, Appendix A - Statement of Procedures on Floodplain Management and Wetlands Protection, the Akron Composting Demonstration Project for the City of Akron has been reviewed to determine what effects, if any, will be caused by construction of the proposed composting facility on a portion of the floodplain of the Cuyahoga River. It was found that wetlands will not be affected by the proposed project."
> (Source: FNSI, Akron Ohio, Phase II Solids Handling Facility, Summit, Ohio, August 1983)

Qualitative impacts describe the type of predicted change, but do not expand on or define the specific or relative magnitude of the projected change.

> "There will be an insignificant loss of wetlands and associated terrestrial and aquatic biota as a result of berm construction along the edge of the wetland.", or "A section of wooded species will be removed from the southern portion of the wetland to accommodate pipeline routing. The amount of vegetation removed, however, will only be slight when compared to the total vegetation within the wetland."
> (Hypothetical)

Quantitative absolute predictions of wetlands impacts are easily recognized, for example:

> "0.5 acres of wetlands will be lost. This is a vernal pond with no surface connection to the nearby, extensive backwater wetlands ....." [This example was paraphrased from a wetlands fill permit application to a state DNR, for a residential development rather than a construction grants project.]

Quantitative absolute predictions would be expected to describe the acreage of wetlands in the study area after the project improvements have been implemented. Note that wetlands may actually increase in some case such as where wetlands are created to treat residual solids.

Quantitative relative would be similar to quantitative absolute except that, rather than specifying a numerical value for the impact, it is described relative to another reference point. "The area will double" or "less than 10% of the area would be affected", are examples of quantitative relative statements. (Hypothetical)

3. Retrieve the wetlands data for the most recent date prior to the NEPA documents and for the most recent date after the installation of the project improvements. As previously discussed, the data collected will depend upon the data available, but, in any event, will require maps or aerial photos of the area which delineate the extent and boundaries of the wetland(s). The boundaries can then be planimetered or measured by a square count method to determine the area of individual and aggregate wetlands in acres or other appropriate units of measurement. The extent, configuration and drainage patterns of the wetlands can also be determined using this procedure. In order to determine construction or other related impacts on the extent and location of vegetation, either aerial photos or narrative descriptions of these features must be reviewed.

   If post installation data cannot be found, a data collection field study will probably be required. If data prior to the preparation of the NEPA document cannot be found in appropriate state (e.g., DNR or equivalent) or local agencies and are not in the affected environment section of the NEPA document, the data should be obtained from remote sensing imagery taken prior to the date of the NEPA document with the assistance of local expertise (State DNR, Fish and Game, Forester; U.S. SCS, Ag. Extension Service; University departments).

4. A comparison of the predicted impacts with the actual data will provide an estimate of the accuracy of the prediction. This comparison, however, must take into account the margin of error and level of precision which can be obtained from the methods used. Examples of potential error include the accuracy of the planimeter (this is supplied by the manufacturer), seasonal fluctuations in water levels and resulting boundary definition of wetlands, scale of maps, and aerial photos and human error. While this is not an exhaustive list of potential sources of error, it does point out some factors which increase the level of uncertainty.

   The reviewer should, to the extent possible, determine the degree of accuracy inherent in all values used in the comparisons as this will influence the reviewer's evaluation of the accuracy of the predictions. If the statement of impact was qualitative, reviewer judgment will be required to resolve the extent to which the actual data reflect the degree of impact perceived by the NEPA document author(s) in the description of the anticipated impact. In some cases, it may not be possible to determine the level of accuracy of predicted values and therefore, will require a subjective judgement to develop a reasonable estimate of the degree of accuracy which could be expected.

Products Required

Appropriate evaluation forms should be completed for each individual predicted impact evaluated. A narrative explaining the procedural steps, including justifications of any and all judgments involved, and a discussion of the implications and results of the evaluation should be prepared.

CHAPTER V

FLOODPLAIN ISSUES

Introduction

Floodplains are protected under several Federal statutues, an Executive Order and various Agency regulations. The primary directive was established in Executive Order 11988, Floodplain Management (42 FR 26951; May 25, 1977). This order directs Federal agencies to insure that their actions do not diminish, but rather restore, preserve, and enchange the natural and beneficial values of wetlands and floodplains. The order instructs Federal agencies to avoid new construction in floodplains except where no practicable alternative is available. In cases where such construction cannot be avoided, mitigative measures must be adopted and special public notice given. Because of this regulatory emphasis and the environmental importance of these areas, it is essential to monitor the impacts of Construction Grants projects on floodplains.

This chapter provides the reviewer with a method for assessing the accuracy of NEPA predicted impacts on floodplains. Floodplain impacts occur when some topographic change occurs in the floodprone area that, in turn, changes the flood staging area, i.e., the river elevation and surface area covered by floodwater in a river valley. Such impacts may result in damage to crops, land and/or structures or may temporarily restrict or impair transportation or certain land uses. The impact assessment may include, but is not limited to, estimates of the number or extent of structures damaged, the dollar loss to property and cropland, and/or the extent of disruption to traffic flow (from flooded streets in floodplains). The environmental standard against which impact is usually measured is the 100-year floodplain boundary.

The discussion of floodplain impacts in NEPA documents may indicate the loss of floodplain acreage, but may not measure or predict any other impact from the project unless flood hazard is a significant issue. This document may state that mitigating measures will reduce anticipated floodplain impacts, such as construction of a retaining wall, berm or a floodflow channel.

While direct impacts to floodplains are the subject of this chapter, direct and indirect impacts may be identified with other environmental issues including, but not limited to, biological resource values, cultural resource values, and water resource values. The reviewer should check sections of the NEPA document appropriate to these issues to determine whether any indirect impacts to floodplains were predicted.

Data Required

Almost all of the data available for floodplains must be retrieved manually on a local, state, or regional level.

If a local government or urbanized area has applied for Federal flood insurance, floodplain maps may be available from the Federal Emergency Management Agency (FEMA) which operates the National Flood Insurance Program. These Flood Insurance Rate Maps, based on detailed engineering studies (many of which were done by the Army COE), indicate 100-year and 500-year flood hazard areas. The maps are updated as necessary. They may be obtained through EPA or the regional FEMA offices or the State DNR library; first by county, then by municipality.

If this map source is not available, USGS floodprone area maps may be obtained by the 7-1/2 minute topographic quadrangle name from the State USGS office or State geological survey. These maps provide engineering estimates of the 100-year flood area and are updated periodically.

Historical flood data are available, but fractionalized. The State DNR (or state water resource agency) may have historical profiles on past flood events. The state USGS office maintains a computerized Peak Flow File, updated annually, as well as scattered data on specific flood events. Local flood history may be recorded on floods of smaller magnitude by the city, county, or local planning agency (e.g., City or County Engineer or County Drain Commissioner). The county USDA-SCS office may have technical flood data if they have been involved in any local floodplain management studies.

In addition, a current land use or topographic map will be needed to identify any changes or development in the floodplain since the NEPA document.

Method

The method consists of five basic steps; (1) determination of baseline ("before" project) condition, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area; and (5) assessment of the accuracy of impact prediction.

The reviewer should locate the predicted impacts from the floodplain section, or indirectly from related environmental issues, of the NEPA document(s). If floodplain impacts have not been predicted, the reviewer will need to locate basic floodplain data. The predictions may take one of three forms: 1) quantitative absolute, 2) quantitative relative, or 3) qualitative.

A quantitative absolute impact measures the degree of impact at some future date. As an example:

> "Floodplains are protected from development by the HUD Flood Insurance program which restricts further development in communities accepting the assistance. All of the local governments in the Study Area have been accepted into the program, and as a result, no impact is anticipated."

> (Source: Environmental Analysis Report, Lehigh County and Allentown, PA, 1976)

Another example:

> "The results of this (100-year floodplain) analysis indicate a stage increase at a cross section located at the pond site of ...0.2 feet."
> (Source: FNSI, Carver, Minnesota, 1982)

A quantitative relative impact describes the magnitude of change from the baseline data of a 100-year floodplain boundary:

> "These methods would eliminate less than 1% of the available floodplain storage acres and are not expected to alter flooding patterns."
> (Source: EIS, Portage, WI, 1979)

In this instance, the reviewer needs to locate further data, specifically the total floodplain acreage under discussion.

A qualitative impact suggests the direction of change, but not the magnitude:

> "A portion of Site B is located within the Corps of Engineers, year 2000, 100-year floodplain. This can be mitigated by flood control measures and is considered insignificant from an environmental perspective."
> (Source: South Canadian Wastewater Treatment Facility, Oklahoma City, OK, 1982),

or

> "While no floodplain maps are available, local floodplain history suggests that any further construction in the floodway will slightly increase the intensity of upstream flooding."
> (Hypothetical)

Specific Steps

1. Determine from the NEPA documents the baseline condition and predicted impacts to floodplains by the project. If possible, define the impacts in terms of acres (area) or acre-feet (volume) of floodplain lost due to construction, or acres of floodplain expansion created by the project. Impacts may also be defined in terms of a change in 100-year flood elevation.

2. Retrieval of actual impacts may not be possible unless a flood of 100-year magnitude has occurred and has been documented since the project

was implemented. If a 100-year flood event has occurred, collect new data in terms of the predicted impacts (e.g., loss of cropland, loss of historic site, etc.). Determine if a new or updated floodplain map has been published since the pre-project data. If no floodplain data update are available, the reviewer should document his or her audit appropriately. If the city or county has kept records of smaller floods of known magnitude, those data might be useful.

3. Evaluation. Several approaches are suggested to determine if predicted impacts were accurate:

   (a) Compare old and new floodplain maps (if both are available) to see if there are any changes in flooding patterns. The reviewer must carefully determine if any expansion of floodprone area was due to the project (either primary or secondary impacts). When two maps are being compared, it should be kept in mind that some margin of error may be inherent when site anaylsis require multiple scales.

   (b) If there is local flood history (pre- and post-project), determine if flood intensity can be associated with the Construction Grants project.

   (c) If no 100-year flood events have occurred, and/or no new mapping or smaller flood history has been recorded, then the minimum determination that can be made is to verify the physical/topographic predictions made in the NEPA document. One example would be the examination of predicted impact areas on an updated land use or topographic map.

Products Required

An evaluation form must be prepared for each predicted impact and for every parameter discussed in the NEPA document. A narrative should accompany the analysis which interprets the evaluation form.

CHAPTER VI

BIOTA ISSUES

Introduction

This chapter presents a method which allows the reviewer to assess the accuracy of NEPA impact predictions related to biota issues by comparing the actual impacts with the predicted impacts. For the purposes of impact assessment studies, biota are usually divided into three groups: (1) Terrestrial (plants and wildlife), (2) Aquatic (phytoplankton or algae, benthic invertebrates and fish) and (3) Rare, Threatened and Endangered species. Within each group, the biota issues may include individual species, populations, natural communities, critical habitats and/or ecosystems.

Impacts to aquatic and terrestrial biota (or their habitats) can stem from the indirect consequence of changes in water quality (or flow), land use or growth and development. Because of the connection with these other impact areas, the reviewer should take care not to identify these other impacts as biotic impacts. For example, a biotic impact would be the predicted change in aquatic species composition and not the reduction in nutrients to a lake that affects species change. Another example of biotic impact is the description of the kind of terrestrial habitat to be destroyed and not the land use impact of a certain number of acres of forest land to be lost. Impacts to the aquatic and terrestrial biota of floodplain and wetland habitats are included in this chapter.

Rare, threatened, and endangered species are protected by Federal and state law. Preservation of habitat is critical to the protection of a species. Rather than estimating numbers of a species, these impacts are often predicted in terms of the potential loss (or enhancement) of critical habitat or specific conditions which are crucial to the survival of a sensitive species in the project area. For example, an impact may address the potential destruction of known breeding, spawning or nesting grounds, or the loss of land area containing a recorded sighting of a rare plant species.

Data Required

The data required should be derived from manual data files of Federal (U.S. Fish and Wildlife Service - USFWS) and State (Department of Natural Resources - DNR, Fish and Game, Department of Conservation) agencies and from local authorities (typically a university or natural history museum). The reviewer must collect updated information on the parameters presented in the NEPA document(s). Typical data might include rare, threatened and endangered species information, aquatic and terrestrial species lists, species ranges, population densities and descriptions of natural communities and unique habitats.

Although there have been proposals to computerize the Federally sponsored data files for biota, these data are not generally available in machine readable form. The major stumbling blocks appear to be the lack of standarized methods for data collection and the absence of any systematic surveys (except for commercial timber resources).

There are potential sources of data on rare, threatened, and endangered species. The U.S. Army Corps of Engineers (COE) maintains a computerized system called the Sensitive Wildlife Information System (SWIS). Information is organized by state and then by sensitive species. The system is operated in conjunction with the USDA-SCS, USFWS, U.S. Forest Service and the Federal Highway Administration. Also, the State of Michigan processes computerized data on Federal and State endangered and threatened species, as well as prime habitat and natural areas in its Michigan Natural Features Inventory, Post Office Box 30028, Lansing, Michigan 48909. Numerous states publish books, pamphlets, and lists of rare, threatened and endangered species. Other states may have similar inventories available.

Method

The method consists of five basic steps; (1) determination of baseline ("before" project) conditions, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction.

The reviewer must derive the predicted impacts solely from the NEPA document(s) and/or any supporting documents. Sometimes needed information, such as species list, are not found in a NEPA decision document but can be located in an appendix or other support document.

There is no standardized way in which to predict biotic impacts. In most documents, the presentation of impacts was determined by the data available at the time. In some cases, an extensive historical baseline may be available or, perhaps, a quantitative biological survey was done as part of the planning. In other cases, a reviewer may find specific information regarding certain species in the project area, e.g., mature hardwoods, game species for fish and wildlife, nesting habitats of certain birds. These data may or may not be quantified. In any case, the reviewer is likely to find predicted impacts described qualitatively with respect to specific baseline data.

If there is no recorded data base for a project area, the document may present a general discussion of what biota might be expected based upon an observation of habitat. Predicted impacts are then qualitative based upon a data base of professional conjecture. It is necessary, therefore, for the reviewer to verify baseline data when qualitative impacts are presented in order to further understand the origin or basis of the descriptive impact.

Basic data may have been altered, interpreted, or manipulated for project use. For example, (1) from an aquatic species list, data on only one indicator species may be discussed, such as the salmon, (2) a species list may be reorganized to indicate pollution tolerant/intolerant species or (3) data on number and kinds of species may be used to produce a diversity index or other data used for a habitat index. Any of the above situations requires that the reviewer uncover the method of data manipulation sufficiently in order to collect the appropriate data updates to repeat the manipulation and understand the limitations and/or assumptions inherent in the methodology. If possible, it is also useful to understand the limitations of the biological data base.

The predicted impacts may be quantitative absolute, quantitative relative or qualitative. Quantitative absolute impacts predict the value of a parameter at some future date. This includes the inference of "no impact" or "zero change", for example:

> "Following completion of construction activities, the wildlife community in the vicinity of the proposed WWTP would be expected to be very similar in composition to that of the preconstruction community."
> (Source: Draft EIS Portage, WI, 1979)

The reviewer may reasonably infer that this means the change will not be distinquishable from normal season to season variation.

or

> "No habitat known to support any designated threatened or endangered species has been identified within the planning area."
> (Source: EA South Canadian Wastewater Treatment Facility, OK, 1982)

Quantitative relative impacts predict the magnitude of change in a parameter by some future date:

> "Land requirements for the construction of WWTP facilities may destroy nearly 10% of the known habitat in the county for the endangered species Haliaeetus leucocephalus, the bald eagle."
> (Hypothetical)

Qualitative biota impacts are the most common and they predict the direction of change in a parameter without estimating the magnitude of that change:

> "This (water quality) improvement will be accompanied by a gradual return of desireable, pollution-sensitive species to these streams."
> (Source: EIS Oaks Wastewater Treatment Facility, Montgomery Co., PA, 1975)

or

> "This (removal of septic tank effluent) improvement will reduce the build-up of high BOD sediments in Lake Winnisquam and possibly result in the reduction of the bluegreen algae blooms common during the summer months."
> (Source: EIS Winnipesaukee River Basin, NH, 1976)

or

> "A few animals would perish."
> (Source: Draft EIS Portage, WI, 1979)

or

> "Related impacts of all alternatives on the Iowa darter would therefore be expected to be insignificant."
> (Source: Draft EIS Nettle Lake - Rural Lakes Project, OH, 1981)

Specific Steps

1. Because the relevant parameters tend to be project-specific, the reviewer must determine which parameters were used as indicators of biotic impact in the NEPA document(s). The reviewer also needs to identify from the NEPA document the geographic areas of potential indirect impact, including bodies of water and terrestrial habitat.

2. Data concerning the identified parameters must be retrieved from the governmental agencies (Federal or state) or local authorities previously discussed. In collecting these data, the reviewer should obtain data taken "after" project completion to compare with pre-project data.

   In the category of rare, threatened and endangered species, determine from available data whether the species status is the same (e.g., Is it still on the list? Is it still threatened?). Verify what, if any, habitat losses or gains have occurred, as well as sightings or counts. If no post-project data are available, the reviewer must consider alternative data collection. Before undertaking any field investigation, the potential benefits of the data to be collected must be weighed against the costs of such a study (as well as evaluating the level of confidence in the baseline data). Local universities, nature groups, or planning commissions may have unpublished data or personal accounts that are usable.

3. Compare the predicted impact and the actual impact to determine the accuracy of the prediction. For impacts which were quantified, the comparative evaluation must take into account the margin of error and level of uncertainty that were assumed in the original predicted impact. If species numbers are being compared (density, diversity) there may be a great deal of fluctuation in impacts because of seasonal variation, sampling method, and simply the inherent variability in extracting a static number from a dynamic living system. Supplementary data, such as a series of data points over time (if available) may be helpful in interpreting a trend. If quantified impacts involve an estimation of acreage, sources of error discussed in Chapters IV and V regarding the use of measuring instruments are applicable here.

   When the statement of impact is qualitative, reviewer judgment is required to interpret the real differences, if any, between predicted and actual impacts. If a qualitative impact, such the direction of a trend, was predicted on quantitative data, the reviewer can use the baseline data alongside the actual quantitative data to assess whether the trend was accurately predicted.

   If predicted impacts are qualitative and based on qualitative data (e.g., minimal predicted impact based upon species thought likely to be found in area), it may be difficult to decide what actual data to retrieve. The reviewer may choose to compare population changes in game species over time as a way to assess the degree of impact. At a minimum, the reviewer could verify the predicted acreage loss or extent of original habitat alteration with the use of updated topographical or aerial maps.

Products Required

An evaluation form must be completed for each parameter examined. In addition a narrative, which will allow the reader to retrace the analytical steps, must accompany the forms.

CHAPTER VII

SOCIOECONOMIC ISSUES

Introduction

The predominate socioeconomic issues addressed in NEPA documents relating to Construction Grants projects are: (1) population, (2) land use, (3) employment, (4) land or property values, (5) user charges as they relate to household income and (6) displacement and/or induced growth. Other issues may be discussed. Likewise, some issue areas may not be discussed because of an assumption (correct or incorrect) that there will be no impact.

Population issues are normally addressed by providing population forecasts over time. Regulations require that forecasts at least cover the project life. In most cases, this is assumed to be twenty years.

Population forecasts used in NEPA documents usually present the population at 5-10 year intervals. Often several forecasts are given, but one set of forecast numbers should have been identified as the "design population or population equivalent". They should not be confused with the planning area or service area population since facilities may or may not be designed to serve the entire planning area or service area population.

It should be noted that population projections in Construction Grants Facilities Plans are not impact analyses (as may be for NEPA documents written for other types of public investment), but are baselines for the analysis of impacts. As such the population projections may be the cause of inaccurate impact assessments and are, therefore, addressed in this chapter.

Land use issues are much like population in that the predictions are the baseline for impact predictions. The forecast landuse, if the project were not built, is the baseline for the impact of the project on landuse. Care should be taken when identifying the predicted impacts, not to confuse the impact of the landuse forecast on the project design. Landuse forecasts are used to develop interceptor routings, plant locations, sludge disposal facilities and other elements of the facilities plan.

Employment issues relate to impact analysis in several ways. The NEPA document statements on employment must be carefully read in order to correctly interpret what is being described. Regional planning agencies often use employment as the major determinant of population forecasts. Other agencies forecast employment as a result of predicted population growth. It should be noted that neither of these situations forecast the impact of the project on employment.

The issues surrounding land values relate to changes in land values near wastewater facilities and relate to the changes in value of land because of a centralized sewer system. Both may be valid impacts, but are expressed differently.

User charges and household income are tied together in impact analysis. A given level of user charges in and of itself is not a problem. The predicted user charge as related to current charges (adjusted for inflation), and related household income are the issues. For this reason, user charges and household income must be addressed together.

Also, displacement and induced growth issues are the major socioeconomic issues of Construction Grants projects. Displacement is defined in two ways: first, as the households which might be forced to relocate because of user charges (as related to household income); second, as the commercial establishments and industrial facilities that would be displaced due to a combination of operating costs and wastewater treatment charges. Displacement may also be caused by construction activities. Expansion of a treatment site, acquisition of a land application site or construction of a pump station all could cause displacement of residences, commercial buildings or industrial facilities. Induced growth is the opposite of displacement. It is the growth caused by the inclusion of sewer service or the expansion sewage treatment capacity which is different in intensity and/or type of landuse described by any approved landuse plans.

Data Required

1. Population. The indicator of population will be derived from the population identified data in the United States census information. The census data are available in two basic forms: census summary tape files (STF) and printed documentation. The printed documentation is normally the most convenient and most readily accessible source. Table VII-1 provides a useful reference chart for locating the appropriate printed census document based on the size of the place affected by the NEPA project. Note that, while complete data are available for places of 10,000 or more persons, some printed data are not available for smaller places and no printed data are available for places under 1,000 persons. In order to examine data for these small places or to examine additional data which is not available in the printed documentation, you must go to the STF files. These computer tape files contain a much larger volume of data than is contained in the printed documentation. There are five STF files which present data in tabular form for different units of geography. For instance, the STF 1 file contains the 100% count items (no census sample data) for all levels of geography down to the census block. The STF 3 file will be of primary interest to NEPA project evaluations. This file contains 150 tables for all census designated places within a state and for census tracts and block groups within places. A detailed listing of the table contents and the tape locations for the tables can be found in the census publication, "Census of Population and Housing, 1980: Summary Tape File 3, Technical Documentation".

As noted above, the census STF files are rather difficult to work with. The STF files are available for each state and for the United States as a whole.

TABLE VII-1

LOCATION FOR CENSUS DATA

Parameter		Census Table Number					
		SMSA's	50,000+	10,000 50,000	2,500 10,000	1,000 2,500	Counties
Persons	1980	GH-1	GH-1	GH-1	GH-1	GH-1	GH-1
	1960 & 70	H-13	H-8	H-18	H-23	H-27	H-60
Households	1980	GP-29	GP-29	GP-36	GB-39	--	GP-49
	1960 & 70	H-16	H-16	H-16	H-16	--	H-16
Housing Units	1980	GH-1	GH-1	GH-1	GH-1	GH-1	GH-1
	1960 & 70	H-13	H-8	H-18	H-23	H-27	H-60
Year Round Units	1980	DH-54	DH-54	DH-54	DH-54	DH-54	DH-54
	1960 & 70	H-13	H-8	H-18	H-23	H-27	H-60
Vacant	1980	GH-18	GH-18	GH-29	GH-36	--	GH-46
	1960 & 70	H-13	H-8	H-18	H-23	--	H-60
Median Income	1980	P-89	P-89	P-107	--	--	P-124
	1960 & 70	GSE-124	GSE-124	GSE-161	GSE-168	--	GSE-180
Median Housing Value	1980	GH-20	GH-20	GH-31	GH-37	--	GH-45
	1960 & 70	H-10	H-10	H-20	H-24	--	H-61
Employment	1980	GSE-121	GSE-121	GSE-159	GSE-167	--	GSE-177
	1960 & 70	P-86	P-86	P-104	P-118	--	P-122

H = 1970 Census of Housing, Housing Characteristics for States, Cities and Counties.
P = 1970 Census of Population, Characteristics of the Population.
GH = 1980 Census of Housing, General Housing Characteristics.
DH = 1980 Census of Housing, Detailed Housing Characteristics.
GSE = 1980 Census of Population, General Social & Economic Characteristics.

NOTE: These publications may be obtained from either (1) the local Census Bureau office, (2) the state data center (each state has a designated center usually located in the state capital or the major state university), (3) any library designated as a census data depository, or (4) from the U.S. Government Printing office.

Many of the state files run more than one computer tape in length. A system has been set up to facilitate access and easy use of the STF files. The EPA computer facilities at Research Triangle Park in North Carolina has a software system set up to extract the census data from these files. The system is comprised of a complete set of STF 3 tapes, a computer program, STF/SAS conversion and display system (SCADS), to extract and label data from the tapes and place the data in a Statistical Analysis System (SAS) data file for processing. The nature of the processing will depend upon the evaluation project, but the SAS package of statistical and programming routines is extremely comprehensive and flexible. Appendices A and B contain a description of this data base and data management (SAS) system.

2. Growth. The indicator of growth is change in landuse. Since accurate landuse information will not likely be available, an increase in number of "housing units", as described by the census, can be included as an indicator. An increase in the census identified "year round units" should be used as an indicator of growth compensated by the conversion of seasonal housing. Information from the operating entity as to the change in households served may provide complementary indicators of growth. The reviewer must understand geographic concepts used by the census, e.g., multi-jurisdictional growth comparisons are urban to rural and metropolitan to non-metropolitan, not urban to metropolitan or rural to metropolitan.

3. Displacement. As an indicator of displacement, only documentation directly linked to the Construction Grants program will be valid due to the exogenous variables of migration patterns. Census data may be used for additional insight.

Displacement pressure is defined in NEPA documents as a function of user charges and household income. "Median household income" from census data should be used as the indicators of income, while the actual user charges should be derived from the operating agency will be used.

4. Property Values/Land Values. The indicator of change in property values and land values is reflected in "housing value" as defined by the census. Local tax records may provide additional information concerning property and land values. The method and frequency of updating local records must be understood if they are to be used to complement the census data.

5. Employment. The indicator of employment change will be the number of employees as defined by the U.S. Census or Department of Labor.

It should be noted that census data for households, vacant housing units, median income, median housing value and employment are not available in the printed documentation for communities below 2,500. In these instances, it is often justifiable to use county values. Although the use of county data will not provide the level of detail provided in larger communities, it can provide an indication of change for comparison with the predicted values, and may be supplemented through discussions with local representatives.

Method

As discussed above, the impacts or effects of a Construction Grants project on the socioeconomic environment are related to changes in property/land values, displacement/induced growth and income. Forecasts of population, land use and employment are indicators of and baselines for the effects. It is important to address the accuracy, the source, and the method of developing these baseline/indicators of socioeconomic impacts since they provide insights into the accuracy of impact predictions.

Population. The three methods of presenting population forecasts are as described in Chapter II (quantitative absolute, quantitative relative and qualitative). Examples of the three forms are as follows:

A quantitative absolute prediction forecasts the level of the parameter at some specific time in the future. An example of such a prediction follows:

> "induced growth would be minimal under Alternatives 1 through 4. Although more treatment capacity would be available under these alternatives, it is unlikely that these facilities would induce population growth above the projected level."

Population projections for the period 1975 to 2000 for the City of Portage:

1975	1980	1990	2000
7,858	8,750	9,750	10,700

Source: Environmental Impact Statement, Portage, WI, 1975.

A quantitative relative prediction forecasts the level of a parameter relative to a baseline:

> "The landuse changes that the project will in part make possible induces new residential development...some but not all of this projected growth (roughly a doubling of residential population) would occur with existing sanitary sewerage policy, given the areas' geography."

Source: FNSI, Clay Township, Hamilton County, IN, 1979.

A qualitative prediction provides a description of the net direction of change in a parameter at a future date.

> "The Facilities Plan Proposed Action...may accelerate the conversion rate of seasonal to year-round housing units...."

Source: Environmental Impact Statement, Nettle Lake Area, Williams County, OH, 1982.

Unfortunately, it is often the case that neither the quantitative nor the qualitative predictions are backed up with supporting documentation such as the source for either the prediction or the baseline population estimate, and it is very uncommon for algorithms to be provided for the projected population figures.

Land Use. Each of the above forecasts/predictions also address landuse changes either directly or indirectly. The Portage, WI EIS combines population and induced population to imply that the landuse changes are planned. The Hamilton County FNSI addresses landuse and population as induced new residential development, and the Nettle Lake EIS addresses land use changes via conversions of uses.

Employment. Employment forecast may or may not be included in NEPA documents. Often employment is only addressed as a component flow calculation. In large construction projects, the effort on construction industry employment may be addressed. Likewise, the change in the number of "operator" jobs may be addressed.

Land/Property Values. The external causes of changes in property and land values dictate that only directional changes be forecast in nearly all NEPA documents. Increases in land values are usually associated with the desirability of new development to locate in areas served by central sewers and/or the increased density allowed by central sewers. Decreased land values are associated with the perceived blighting influence of wastewater treatment and disposal facilities within close proximity to residential development. As stated above, tax records may provide additional detail complementary to the census data.

Income/User Charges. User charges may be expressed in NEPA documents as follows:

> "....impacts of these costs are defined in terms of the percentage of the population facing a significant financial burden. Applying the threshold of 1.5% to this income results in a figure of $212; or $102 more than the average annual homeowner cost of $110...."

EPA considers a project high-cost when the current guidelines are exceeded, however, the Agency will avoid labeling projects "expensive" because when health or income is primarily identified with quality of water resources, attitudes of best possible water quality typically reflect "necessity".

It should be noted that the relationship between user charges and household income became a guideline definitive criterion for the determination of a high cost project in 1980. Since that time, the percentages used and the income levels have changed. This does not, however, effect the accuracy of the impact prediction, but rather may alter today's qualitative judgment as to the severity of the impacts.

The impact and user charges must be identified to determine: 1) If current charges are consistent with projected charges; and 2) The range of variation in predicted/actual charges and median household income.

Displacement/Induced Growth. The causes of displacement and induced growth can often be external to the study area of a facilities plan. When analyzing the actual impacts, one must keep in mind that what appear to be an incorrect prediction of induced growth may be caused by a national, regional, or local economic downturn or recession. Similarly, displacement may be primarily the result of unemployment, energy shortages or social issues rather than high user charges. Initial analysis should begin with the direct displacement due to building. The information from the census provide insight as to the magnitude of change, but will not provide an understanding as to the causes.

Specific Steps

1. Identify the counties and communities affected. This is done by reviewing the introduction and/or affected environment sections of the NEPA document which will delineate the counties and/or communities involved in the study area. It may also be necessary to review the population section of the document where specific population forecasts are given in order to identify all involved communities. Often the population section is the only section which identifies all of the communities within the counties or service area and describes those communities only partially served.

2. Retrieve the census information for the state. This will be retrieved either from printed documentation or from census tapes. If census tapes are to be used, the reviewer will need to establish contact with the EPA computer facility. Contact should be made with the User Support Group. They should provide the reviewer with the necessary terminal set up procedures, accounting procedures, and with documentation on how to use the facility.

3. Retrieve the user cost data. The user charges for the project must be obtained from its operating agency. Average household user charges must be obtained or calculated from the information supplied by the operators. Be aware that one service area may have several rates or user charges per type of service.

4. Identify the predicted impacts. The document being reviewed must be examined to determine the predictions made. If the impact analysis gives only qualitative impacts, then the alternative analysis section of the NEPA document should be examined to determine if a quantitative prediction was provided. The evaluation forms in Chapter II should be completed as appropriate to the type of predicted impact. The source of the prediction should be identified since it will provide insight into the factors responsible for an over or under estimation of impacts.

5. Conduct the evaluation. The comparison of the actual value of the parameter to the level predicted by the NEPA document will provide an estimate of the accuracy of the prediction. For example, if the EIS specifies a 1% growth rate for the population and uses a baseline population estimate from the 1970 census, a predicted population for 1980 can readily be calculated. Note this figure represents a linear projection from the 1970 base along a growth rate of 1% per year from the 10 time points between 1970 and 1980. The actual growth rate can be computed by taking the 1970 figure and comparing it with the actual 1980 population. The actual growth rate between 1970 and 1980, can then be calculated and may be projected beyond 1980 to the limit of the project duration. These two rates of growth; one derived from the EIS; and the other derived from a recalculation based on our new knowledge of the actual 1980 population, are both fixed rates and, therefore, our population projections are both projections from some known population base figure. The statistical comparision could be based on determining how close the rates are to one another (e.g., the rate based on the known 1980 population is 10% higher than the EIS rate or show how the projected population figures differ over time and compare the projected figures at different time points, such as the actual 1980 population is 10% higher than the EIS projected population and the new 1990 projected figure is 15% larger than the EIS projected figure). The key to each of these approaches is, of course, the rate of growth and since the two rates are generated from actual census population figures, the magnitude of their difference is the basis for the comparison and statistical significance tests are not appropriate. The researcher should determine in advance what degree of accuracy (e.g., ± 10%) is acceptable for concluding that the initial population projection was accurate. Caution is warranted because actual growth rates are not typically straight line increases, even though in time, the actual and final prediction value may be identical.

If a sample of projects is considered and a comparison of these projects based on their population predictions is desired, then the use of a paired T-test would be appropriate for comparing populations at two points in time assuming that the projected population is correlated positively with the baseline figure. The T-test results will allow the reviewer to conclude whether or not the mean difference in population size between time 1 and time 2 is significantly different than zero for the sample of projects. The reviewer must account for, in those examples, the standard error and confidence bounds of the census bureau's data before determining the difference as significant. Also, the reviewer must realize that same percent differences in metropolitan population counts have a dissimilar magnitude in small towns, e.g., a 10 percent population increase/decrease in a town of 200 will be unlike a 10 percent increase/decrease in a metropolitan city of two million.

Another aspect of this analysis is an examination of other demographic parameters in order to provide a profile of the socioeconomic makeup of the place or places being studied. This analysis may provide insight into the causes for the accurate or inaccurate nature of the EIS projections. For example, if there was a significant increase in the number of year-round housing units or a significant decrease in the median household income, these changes may precipitate a change in the population size. The direction of causality can be very ambiguous in these types of analyses, but the outcome from generating a profile is a much better understanding of the overall trends. Clearly, when dealing with small area geography, a single event such as a plant closing or opening can have a major impact on any population projection. Knowledge of these events and general socioeconomic trends can assist the reviewer in determining whether the EIS predictions were done poorly or whether external factors or catastrophic events drastically changed the assumed project parameters resulting in inaccurate predictions. The local chamber of commerce is an additional data resource which might facilitate this analysis.

Products Required

Appropriate evaluation tables must be completed for each predicted impact evaluated. A narrative explaining the procedural steps, including justifications of any and all judgments involved, and a discussion of the implications and results of the evaluation must be prepared. It is strongly suggested that graphics be used in place of numerical and textual information whenever possible. A graphic which is appropriate and well done will often convey information at a glance rather than requiring pages of text or tables.

CHAPTER VIII

AGRICULTURAL ISSUES

Introduction

This chapter provides the reviewer with a method for assessing the accuracy of NEPA predicted agricultural impacts. The parameters used to indicate impacts to agricultural land may include the amount of acreage currently in agricultural use and farm-related data such as numbers of farms, average size of farms or farm values. While farm-related data are not as valuable in reflecting impacts as data on acreage in agricultural use, they may be found in the NEPA document. Since the updated 1979 regulations for implementing NEPA, significant agricultural lands must now be identified in the preparation of an EIS in accordance with EPA's Agricultural Lands Protection Policy. The EPA policy, consistent with the United States Department of Agriculture's (USDA) guidelines, officially recognizes seven agricultural land types (based on a soil's capability for production): prime farmland, unique farmland, additional farmland of statewide importance, additional farmland of local importance, farmlands in or contiguous to Environmentally Sensitive Areas (ESA's), farmlands of waste utilization importance, and farmlands with significant capital investments in Best Management Practices (BMP's). (See 7 CFR Part 657 for a more complete discussion of these terms.) If these designations have been identified at the county level by SCS, then impacts may be estimated, for example, in terms of acres of prime farmland lost. If this farmland designation system has not been used, then soil capability groups (Class I - VIII) might be used to assess impacts to open land suitable for farming. It is likely that early NEPA documents have not discussed these special agricultural ratings and have only predicted impacts for land that is currently in agricultural use - whatever its productive capability or designation. The reviewer must be cognizant of this distinction.

Conversion of agricultural land to non-agricultural use is the primary adverse impact of Construction Grants projects and is controlled by local and regional land use planning through zoning ordinances and/or taxation rates. Agricultural land impacts may also be estimated in NEPA documents(s) as the rate of change in land use.

Data Required

The reviewer should collected from NEPA document(s) or other sources data on soil capability groups and/or agricultural land designations (prime, unique, etc.) on a county basis from the County Soil Conservation Service (USDA-SCS). If required, county soil surveys include information, by soil type, on the productive capability of soils (soil classes). The special agricultural land designations may or may not have been identified by the SCS. These data are available by distribution of soil types and not by legal boundaries or platted land. For this information, the reviewer should obtain an updated land use map from the area planning commission (or city, township, or county planning office). Additionally, one may also need to collect updates on the rate of agricultural land change, from the local planning commission, if predicted impacts were based on rates of change.

Method

The method consists of five basic steps; (1) determination of baseline ("before" project) conditions, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction.

The reviewer should obtain the predicted impacts and possibly the baseline data from the Affected Environment Section of the NEPA document. The impacts may take one of three forms: quantitative absolute, quantitative relative or qualitative. A quantitative absolute impact measures the amount of impact at some future date:

> "the construction of this line will open approximately 20 acres of prime farmland north of the alignment to potential land use conversion.... If development of these 20 acres would occur, the amount of prime farmland lost would not be significant when compared with the total amount of prime farmland in the county. In addition, these 20 acres comprise only 0.4% of the prime soil series in the planning area."
> (Source: FNSI Saline, MI, 1981)

A quantitative relative impact describes the magnitude of changes from baseline values at some future date:

> "Open land and agricultural land in the study area, summarized in Table 10, contain primarily Class I and Class II soils for farming. Nearly half of this acreage may be subject to secondary development pressures as a result of the proposed project."
> (Hypothetical)

A qualitative impact suggests the direction of change, but not the magnitude:

> "Some agricultural land is expected to be converted to residential use over the 20-year planning period. This will occur in accordance with the Pittsfield Township Comprehensive Plan which has made provisions for phasing of development and protection of a majority of its agricultural land."
> (Source: EA Muskingum County, South Zanesville, OH, 1983)

or

> "...urbanizing trends are evident on some of the prime farmlands, particularly north of Portage around the Rt. 78 interchange and east of Portage near the intersection of Routes 33, F and EE. No unique farmland would be involved." (Source: EIS, Portage, WI, 1979)

Since a national agricultural goal is the preservation of land that has high productive capacity, impact sections may only discuss local trends and pressures toward agricultural land use conversion followed by a discussion of local mechanisms for minimizing the loss of such lands. This would generally fall under the category of qualitative impacts. Professional interpretation would be needed to determine whether any agricultural land use conversion had been project induced (either primary or secondary impact).

Specific Steps

1. Obtain predicted agricultural land impacts from the NEPA document(s) as well as any other basic data that might provide factual information, such as geographic location of the land involved. The Affected Environment Chapter (or the inventory chapter in earlier documents) is the primary location of this information.

2. Manual data retrieval will be necessary at a local or county level. Contact the regional or county planning commission for updated information on conversion of agricultural land to non-agricultural use. This information may be direct data or may require map interpretation. Distinquish between land use change that was attributable to the project and that which was not. Local land use planners may assist in data interpretation but final decisions on project-related growth are the responsibility of the reviewer. Next, check SCS maps to determine the status or rating of the converted agricultural land. Convert the information as necessary to the form presented in the NEPA document, such as percent of total or acres of prime agricultural land converted.

3. Actual impacts may be recorded as rates of change, as a specified number of acres, or as a land use conversion trend.

4. If the predicted impact was qualitative, use updated information to verify the direction and intensity of the impact. Qualitative impacts of agricultural land use conversion trends will require professional interpretation. Local planners may provide insight on changes in the local economy, land taxation rates and other factors that may be occurring independently of project related growth which would alter trends in agricultural land conversion.

   Predicted quantitative impacts (absolute or relative) can be directly compared with actual impacts. Interpretation of numbers may be necessary since:

1. inaccurate predictions may be more likely with secondary impacts than with the land requirements for a specified use, such as a land application site;

2. some minor inaccuracies (10-20%) are inherent in SCS maps and in the engineering planning of land requirements for construction of facilities, and

3. estimates of land use change or pressures for growth predicted by the area plan commission may have been used, unchanged, in the NEPA document.

The reviewer should be aware that other considerations may also exist for a particular project.

Products Required

Evaluation forms should be prepared for each predicted impact and for every parameter discussed in the NEPA document. A narrative should accompany the analysis which interprets the evaluation forms.

CHAPTER IX

PHYSICAL ENVIRONMENT ISSUES

Introduction

This chapter provides the reviewer with a method for assessing the accuracy of NEPA predicted impacts on the physical environment of Construction Grants projects. The physical environment includes the categories of climate, topography, soils, and geology. None of the physical environment issues can be addressed using machine processable data bases. This is due to the limited availability of machine readable data bases for physical environment parameters, and to the site-specific nature of potential impacts.

Impacts related to the physical environment are project specific, thus, the NEPA document should be carefully reviewed to determine what impacts were addressed. Lack of impact analyses for any of the physical issues does not preclude their existence. It is likely that in pre-1979 NEPA documents, these physical environment issues were addressed only in a cursory manner. The reviewer should use this manual to assess the accuracy of impacts that were predicted.

Many of the impacts to physical features are unavoidable and some are irreversible changes which were considered environmentally acceptable tradeoffs in the planning of the proposed action. Some examples are (1) changes in soil properties from cut and fill activities, (2) changes in topographic features from grading activities, or (3) dedication of land to a particular use, e.g., landfill, road right-of-way, or a WWTP site. A reviewer may find additional information on the nature of the impacts in the mitigating measures section of the NEPA document.

Climate. Long term changes in microclimate may result from certain projects whose climatic impacts are of significant magnitude. An example of this may be cooling towers of power plants emitting large amounts of water vapor. Adverse impacts such as higher incidence of dense fog and street icing from high humidity may occur. Primary indicators of climatic impacts might be estimated as the quantity of water (vapor) to be emitted daily from a facility, e.g., as increases in local relative humidity due to the burning of solid waste.

An indirect indicator of this impact may be an increased number of traffic accidents at that location; assuming provable causality. A predicted impact such as this may be located in another section of the document, such as transportation or secondary impacts. Climatic impacts (short and long-term) resulting from dust generation are addressed in Chapter XIII, Air Quality Issues.

Topography. Project impacts to topography result from short-term construction activities such as cut and fill (for sewers, roads, etc.) site preparation (solids disposal site, WWTP site, or other facility site) and the generation and disposal of spoil material as well as long-term impacts from final site grading. These impacts may be quantified in terms of the quantity of soil to be generated, the adequacy of the intended disposal site, the dimensions (length, width, and depth) of cut and fill activities, the specific acreage needed for construction of a facility or the percent slope not to be exceeded in grading.

Impacts to topography might also be found within a discussion of aesthetics, for example, the loss of a specific view or changes to the character of geographic area sufficient enough to change its appeal.

Soils. Project impacts to soils result from construction activities and can change soil properties (chemical and textural). The parameter of soil disruption is probably inappropriate to an urban setting which may have already been substantially altered. Such impacts are generally measured by the total area affected. Impacts to soil properties from sludge or other solids are addressed in Chapter XI, Solid Waste Issues.

Another impact issue is soil loss, or erosion, which may be addressed in a mitigating impacts discussion as well as in a general impacts section of the NEPA document(s). Erosion impacts may be short or long-term and are generally estimated qualitatively or with a qualitative comparison to average annual soil loss estimates from agricultural activities. Unless soil loss is a major impact issue, impacts are usually not quantified because of the difficulty in accurately estimating all of the variables in the Universal Soil Loss Equation (USLE) of the Soil Conservation Service. Often in a project, the identified areas of potential erosion impact have already been disturbed (sometimes called man-made soils) and calculation of the USLE is made more difficult. Another rationale for not quantifying soil loss is that erosion should be minimized if mitigating measures are dutifully followed. Determining the accuracy of predicted impacts is difficult at best since there is no way to quantify actual erosion or soil loss versus a predicted quantified soil loss estimate after the project has been constructed, unless an on-site monitoring program is instituted prior to and maintained throughout the planning period. This is rarely, if ever, the case. However, through the personal observation of steep slopes and nearby streams, the reviewer may be able to identify excessive erosion or siltation. In a project of significant magnitude, (e.g., a land application project) preliminary measurements could be made against which predicted and actual impacts would then be judged.

Data Required

Impacts to the physical environment are very site specific, thus, manual data files are most applicable for the parameters or issues evaluated. Operation and maintenance (O&M) records from a facility will contain data on atmospheric emissions (e.g., water). Construction monitoring records (kept by EPA) or records kept by the design or construction contractors may include the quantity of fill used or spoil generated and its source or disposal location. The State or municipality involved can identify contractors not maintained in EPA records.

City or county engineering maps will indicate all areas of new sewers, roads, and construction sites. Interviews with local SCS staff and updated land use maps from the city or area plan commission will provide additional information on surface feature changes. Post-project aerial photos or updated USGS topographic maps of the study area may be used to detect changes in surface drainage patterns.

Methods

The method consists of five basic steps; (1) determination of baseline ("before" project) conditions, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction. The predicted impacts are derived solely from the NEPA document for the project. Each prediction will take one of three possible forms: qualitative (a statement which gives an indication of the direction of change in a parameter), quantitative relative (a statement which describes the changes from baseline values at some future date) or quantitative absolute (a statement which measures the amount of impact at some future date). The actual impacts are derived from collecting post-project information on the impact parameters. These data may come from existing sources or from field studies when no other data source is available. The two sets of impacts are compared and professionally interpreted.

A crucial step is the derivation of the predicted impacts. It is important that the reviewer exercise professional judgment when interpreting qualitative impacts, expressed as slight, minimal, insignificant, or substantial so as to minimize misinterpretations of the author's intended perception of the potential impact. An exception is the use of "no impact" or "undetectable" in a qualitative impact. These phrases can always be translated as a quantitative relative statement indicating that the magnitude of change is zero. The absence of discussion of an issue in a NEPA document (e.g., soils, topography, etc.) should not be automaticlly assumed to imply that there is no impact or that it is of zero magnitude. Rather, the reviewer should be alert to the possibility of unanticipated impacts which are addressed in Chapter XIV.

Specific Steps

Information derived in the following steps should be entered onto the evaluation forms described in Chapter II.

1. Using the NEPA document, identify the location and baseline characteristics of the specific physical areas to which impacts are expected to occur. This information should be located in the "Existing Conditions" section, the "Description of the Proposed Action", or in the section on

"Impacts of the Proposed Action". For these physical environment issues, the reviewer needs the most site specific information available, and in some cases, that information may be in the "Analysis of Alternatives" section.

2. Identify the predicted impacts. The NEPA document must be reviewed to determine exactly what the author predicted. It is common to find that impacts to physical features are stated either qualitatively or as a quantitative relative statement. For example:

> "Site B is relatively flat and therefore adverse erosion loss is not anticipated."
> (Source: South Canadian Wastewater Treatment Facility, Oklahoma City, OK, 1982)

or

> "Soil erosion from construction activities are inevitable impacts which can be somewhat mitigated by strict adhesion to the N.C. Sedimentation Pollution Control Act of 1973 guidelines. These guidelines specify that every construction activity must have an approved sediment control plan."
> (Source: 201 Facilities Plan for Wendell and Zebulon, North Carolina, 1975)

Quantitative absolute predictions are rare.

> "The excavation of tunneled sewers, cut and cover sewers and the CSO control structure will create nearly 2.0 million cubic feet (56,600 m^3) of spoil. Disposal of this spoil in a haphazard, uncontrolled manner will cause significant long term, adverse impacts."
> (Source: Detroit Segmented Facilities Plan, 1978)

In the preceding example, deletion of the word "nearly" would create a quantitative absolute prediction.

3. Identify and then collect the appropriate data from manual sources as discussed under the earlier section, Data Required. Make any current quantifiable data compatible with the terms used in the NEPA document (e.g., truckloads of spoil/day equals x $ft.^3$/day) for purposes of comparison. In retrieving data, the reviewer must collect the most recent post-project data. If post-project data, such as SCS interviews, aerial photos or updated topographic maps are not available, an on-site inspection will be required.

4. Compare the predicted impact and the actual impact to determine the accuracy of the prediction. For impacts which were quantified, the comparative evaluation must take into account the margin of error and level of accuracy that were assumed in the original predicted impact. Engi-

neering estimates of construction activities made during the first phase of planning may contain a margin of error between ± 10-20%. SCS mapping error on soils are also possible. The reviewer should also keep in mind, if using a planimeter to determine actual impact area, the accuracy of the tool, the scale of the maps being used and, of course, human error.

When the statement of impact is qualitative, reviewer judgment will be required to resolve the extent to which the predicted and the actual impacts, each perceived by different people, agree with each other. Almost all of the qualitative impacts predicted for physical features are mitigated to some extent by measures recommended in the proposed plan. In addition, many of these impacts were assessed as short term and no records may have been kept regarding their degree of severity for such a short time. From a practical point of view, the reviewer may only be able to assess those impacts to physical features which were severe enough in nature to have become long term impacts on the land (severe erosion, creation of wet spots from drainage pattern changes, etc.). In a case where short term, minimal soil loss was predicted and the reviewer observed (either by appropriate maps or first hand observation) long term effects of erosion on the project site, an interpretation of the inaccuracy of prediction would be required. Logical answers might be that mitigating measures were not adhered to during construction or that the qualitative estimate of erosion potential did not reflect the basic data on slope, soil type, and climatic conditions.

Products Required

Appropriate evaluation forms must be completed for each individual predicted impact evaluated. A narrative explaining the procedure steps, including justification of any and all judgments involved, and discussion of the implications and results of the evaluation must be prepared.

CHAPTER X

CULTURAL RESOURCE ISSUES

Introduction

This chapter provides the reviewer with a method for assessing the accuracy of NEPA predicted impacts on cultural resoures. NEPA documents must identify the presence of cultural resources (this includes architectural, historic and archaeological resources) that are presently in or eligible for inclusion in the National Register of Historic Places. Such properties must be identified in the primary impact areas of a project. "Primary impact areas are those where ground will be disturbed for the project, such as the plant site, pumping station sites, access roads, and rights-of-way for interceptors. Areas in which the wastewater treatment facilities will have direct visual, odor, or aerosol effects may also be primary impact areas if they are likely to contain cultural properties of a type which are susceptible to such impacts and if the proposed project has been designed so as to be exposed to view or will emit odors or aerosols." This quote and the guidance which follows is based on USEPA Region V 1984 draft revised guidance for archaeological and historical preservation.

The NEPA document will contain evidence of consultation with the State Historic Preservation Officer (SHPO). The USEPA, in consultation with the SHPO, makes recommendations on the need for a preliminary reconnaissance survey of the area if a known or potential site would be affected by the proposed project. A letter to this effect will be found in the facilities plan documentation.

If the preliminary survey conducted by a qualified professional does occur, results of the survey and further consultation between EPA or delegated State and the SHPO will be documented. The survey results will conclude either (1) no adverse effect is anticipated and project action may proceed or (2) an adverse impact is anticipated and a survey is warranted.

To summarize the procedure, there are three situations that may arise when dealing with a National Register property. ("Effects" and "impacts" as used in 40 CFR 1508.8 are synonymous).

1. No effect. This addresses the usual or routine situation of no cultural sites in primary impact areas of the project. The first letter of documentation ("sign-off" letter) from the SHPO satisfies this situation.

2. No adverse effect. This addresses the less than ideal situation where any impacts which surface during construction can be mitigated. It also covers projects which may reveal unknown archaeological artifacts that can be salvaged during project construction.

3. Adverse effect. This addresses the least suitable situation where adverse impacts are identified and cannot be acceptably mitigated. A specific consultation procedure occurs involving the National Advisory Council on Historic Preservation, USEPA, the SHPO, the State Water Pollution Control Agency, and the grantee. This consultation either results in an acceptable memorandum of agreement or further procedures regulating the failure to avoid or mitigate adverse effects.

Data Required

The reviewer must contact the SHPO to determine if any significant archaeological finds or any architectural/historic landmarks were discovered prior to or during construction of the project. The reviewer must then determine if the state maintains any follow-up records of NEPA projects, particularly with reference to the implementation of mitigating measures.

A site visit may be necessary to document long-term mitigating measures to cultural resource sites, properties, or buildings where no other source of data are available. It may be useful to check with local authorities (universities, museums, historical societies) to document changes on or surrounding a site. Also, the reviewer may wish to contact the archaeologist or historian involved in any of the evaluations, mitigation efforts, or recovery operations.

Method

The method consists of five basic steps; (1) determination of baseline ("before" project) conditions, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction.

Impacts may take one of three forms: quantitative absolute, quantitative relative or qualitative. A quantitative absolute impact measures the degree of impact at some time in the future. Ideally, a Construction Grants project will have been planned so as to avoid adverse impacts to cultural resources or at least satisfactorily mitigate them. If in either of these situations the concept of zero impact is inferred or expressed, the impact is categorized as quantitative absolute:

> "In addition, the State Historical Preservation Officer (SHPO) concurs that the construction of wastewater treatment facilities at the alternate sites or the expansion of facilities at the existing site would result in no adverse effect to properties

> that are listed on or eligible for inclusion on the National Register of Historic Places (By letter; Mr. Richard Erney, State Historical Society of Wisconsin, to Mr. Charles Sutfin, USEPA, 14 April 1980).
> (Source: Draft EIS, Portage, WI 1979)

A quantitative relative impact describes the magnitude of change in a parameter expected at some future data:

> "As much as half of the scenic view from Fort Sumpter National Park may be impaired after construction of the WWTP. Long-term adverse impacts can be mitigated by construction of a vegetative buffer to screen the plant from view."
> (Hypothetical)

More typically in a NEPA document, cultural impacts are qualitative. That is, they indicate the direction of an impact (adverse or beneficial) without estimating the magnitude of that impact. Examples of qualitative impacts are:

> "The elimination of the existing WWTP would result in a beneficial aesthetic (secondary) impact to these National Register sites. The existing WWTP is in a direct line of sight from these properties."

and

> "The Old Indian Agency House would be impacted during both the construction phase and operation phase. The aesthetic and noise impacts during operation would detract from the historical and architectural integrity of the Agency House and would alter the National Register significance of the site.... If this alternative was implemented, mitigative measures would be taken, subsequent to SHPO and Advisory Council consultation."
> (Source: EIS, Portage, WI 1980)

Specific Steps

1. From the NEPA document(s), identify the predicted impacts to cultural resources. Detailed statements of impact may be located in the SHPO documentation in an appendix or support documents if they are not specifically stated in the impact section of the main document. Also, a map should be located which has all the properties or resources marked relative to the primary impact areas of the project. Where archaeological sites are an issue, locations are deliberately kept vague in documents to protect the site from potential vandalism. It is essential to check with the SHPO and the USEPA project file/person to obtain more detail. Note

where impacts are defined assuming specific mitigating measures will be carried out.

2. Telephone calls for manual data collection is needed to verify the predicted impacts. Any records that exist which document implementation of mitigating measures should be collected. Conduct site visits, as necessary, to confirm that mitigating measures were carried out.

3. The reviewer can use quantified information from project records to compare with quantitative impacts to determine the accuracy of the predicted impact. Qualitative impacts, using terms such as slight, moderate, severe, must be interpreted carefully by the reviewer. It may be useful to seek advise from the SHPO in the interpretation of qualitative impacts.

Products Required

An evaluation form must be prepared for each predicted impact in the NEPA document. A narrative should accompany the analysis which interprets the evaluation procedure.

CHAPTER XI

SOLID WASTE ISSUES*

Introduction

Environmental issues associated with solid waste may be associated with all of the issues addressed in other chapters. Each of the issue areas in the NEPA document should be reviewed to identify all impacts associated with solid waste.

The volume of solid waste generated in a Construction Grants project depends upon the volume of wastewater treated and the solids processing methods utilized. Both the quantity and the quality of processed solids affect the method of disposal. An increase in the quantity of sludge will affect transportion impacts - number of truckloads/day hauled. These impacts may be discussed under energy or cost sections in the NEPA document(s).

Site selection studies are commonly conducted to choose the most environmentally suitable solids disposal site(s) from available land in the immediate region. Disposal plans involving land application of sludge must address potential impacts to on-site environmental aspects such as surface and groundwater quality and human health, as well as economic, social and political factors. Guidelines and regulations exist that protect other features of the environment from adverse impact, such as biota, floodplains, wetlands, agricultural land and cultural resource sites, in the early planning stages of the siting process. If any impacts are predicted or mitigating measures recommended for these issues, chapters of the Manual appropriate to these issues should be implemented. Similar environmental issues are addressed when choosing a landfill site for disposal of sludge or incinerator ash. Some of these issues have been discussed under other chapters.

NEPA documents address the placement of construction debris or land application of sludge on natural resources in or beyond a planning area. Consequently, environmental issues including, but not limited to, placement of overburden (spoil), leachate collection and treatment and monitoring of groundwater wells are discussed among the solid waste issues.

Sludge quality imposes retrictions on the type of site chosen as well as the rate of sludge application to the land. The cation exchange capacity (CEC) of the soil is one of the factors which determine a soil's ability to accept large amounts of sludge over time. Concentrations of cadmium and other toxic compounds are indicators monitored in soils receiving sludge.

In the situation where a land application and/or landfill site is already in use, solid waste impacts may assess the remaining capacity or "life" of the site. These impacts may be estimated in terms of the proposed quantity of sludge/ash to be received or as a percentage or increased rate of capacity utilization of the disposal site.

* Waste does not infer unusable because spoil and sludge have market values. The term "waste" simply refers to by-products.

Many early NEPA documents may not have addressed solid waste impacts because the existing system worked satisfactorily and because no guidelines or regulations were in effect. For uniform application of this manual, one has to assume that the author intended a statement of no impact by excluding the solid waste section of a planning document. Planning documents should specifically address solid waste disposal.

Data Required

The data required for this section include the NEPA predictions regarding solid waste issues, current data from solids processing and solids disposal sites operating and/or monitoring records. These data would include information on the quantity and quality of solids generated (e.g, lbs/day, tons/yr, ppm Cd, ppb PCB). Data on the solids disposal site(s) can be retrieved manually from site operating or monitoring records or from the state solid waste management agency that monitors the site.

Method

The method consists of five basic steps; (1) determination of baseline ("before" project) conditions, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction. From the NEPA documents, the reviewer must locate the predictions on the solids quantity and the solids quality specific to the intended disposal method. The reviewer will also need to know the proposed disposal plan. This information will be of help in identifying appropriate impact issues (air quality, soil, energy, etc.) discussed elsewhere in the document(s). Impacts of solid waste on the environment may be found in the various NEPA impact sections or may be organized under a single heading in the document. All sections will need to be searched for solid waste impacts.

The impacts may take one of three forms: 1) quantitative absolute, 2) quantitative relative or 3) qualitative.

A quantitative absolute impact measures the degree of impact at some time in the future:

> "An estimated 750 lbs/day dewatered sludge will be generated at the new facility, at design capacity, and transported to the county landfill. Assuming all other inputs to the landfill remain constant, the additional sludge load will reduce the projected life of the landfill by approximately three years."
> (Hypothetical)

or

> "Based on sludge quality and current limits for cadmium an PCBs, land application rates will average 5 tons/acre dry solids. Having designed the land application program within existing guidelines and following all recommended mitigating measures, no adverse impacts are anticipated."
> (Hypothetical)

A quantitative relative impact describes the magnitude of change in the parameter expected at some future date:

> "An increase of no more than 20% more sludge per annum will be generated from the proposed solids processing program. Sludge hauling operations (truck traffic, vehicle maintenance, capital and operating costs) will increase up to about 20% per annum. No impact is anticipated to land spreading facilities because adequate acreage is available through the planning period."
> (Hypothetical)

A qualitative impact suggests the direction change, but not the magnitude:

> "Since the recommended land spreading application rates are based on a balance of the nitrogen uptake by the crop, the natural assimilative capacity of soil is not exceeded, thus, significant adverse impacts on groundwater quality are highly unlikely."
> (Source: Municipal Sludge Land Disposal Feasibility Study, Logansport, Indiana, 1979)

or

> "By following the guidelines which have been proposed for land spreading, it is highly unlikely that any hazard to public health would occur with the land spreading alternative. To ensure that guidelines are met, a continuous monitoring program would be established as part of the overall sludge management project to accurately determine sludge quality and define appropriate application rates. Thus, on a similar scale of 1 to 5, the land spreading alternatives are rated a 5, virtually no hazard to public health."
> (Source: Municipal Sludge Land Disposal Feasibility Study, Logansport, Indiana, 1979).

Specific Steps

1. In the NEPA document(s), locate the predicted environmental impacts related to solids processing and disposal issues, either in a solid waste section or as part of the overall impacts sections. If solid waste impacts do not directly address environmental issues, determine if data on the quantity and quality of solids are provided.

2. Retrieve from the facility operators data on the current solids quantity and quality. If current data are needed on solids disposal sites, obtain monitoring records from the operators or the state monitoring agency.

3. In situations where a document did not provide specific impact assessment (issue by issue) or only a qualitative assessment, the reviewer can compare the predicted solids quantity and quality with the actual values on solids quantity and quality. Make any adjustments (percentages, rate of changes, etc.) necessary to the actual data to parallel the form of the prediction. This comparison will only provide an indirect evaluation of impact accuracy and assumes the predicted qualitative impacts were based on the predicted estimates of solids quantity and quality. Reviewer interpretation should include such factors as whether the predicted and actual data represent the same operating numbers (average, design, or peak production capacity) and normal engineering design margin of error (10-20%).

4. For documents that provide specific solids impacts to air and/or water quality, amount of land used, or energy consumption; for example, compare with current operating or monitoring data to assess accuracy. The same precautions apply in interpreting the accuracy of impact comparison as discussed in item #3.

Products Required

An evaluation form must be prepared for each predicted impact and for every solid waste parameter in the NEPA document. A narrative should accompany the analysis which interprets the evaluation form.

CHAPTER XII

ENERGY ISSUES

Introduction

Energy came to the forefront of environmental concern after the 1974 oil embargo by the Organization of Petroleum Exporting Countries. Prior to 1974, energy concerns in NEPA documents were often given only cursory examination and were included as one of the many non-renewable resources. Modifications to 40CFR6 have changed that emphasis. The criteria for the decision to prepare an EIS includes "...deleterious changes in the availability or demand for energy"; (40CFR6.506(a)(1)(vii)). Alternatives to be considered in NEPA documents include "...appropriate energy reduction measures": (40CFR6.507-(c)(5)(vii)). The discussion of environmental consequences include "...energy requirements and conservation potential...": (40CFR1512.16(e)).

Early NEPA documents may not have a separate section on energy. Rather, they may include any energy discussion in the section titled "Irreversible and Irretrievable Commitment of Resources". Impacts in these discussions are generally qualitative or qualitative relative (e.g., most to least energy intensive). More recent documents may address energy in the environmental consequences of alternatives where energy use may be quantified. The impacts addressed in either the earlier or later documents are often limited to the operation of the onsite facilities. It should be noted that energy is consumed in the operation of facilities and by pump stations, sludge hauling and landfill operations.

Where anaerobic disgestion is used, methane gas is a by-product. This may be vented as waste gas or may be used to augment other fuel sources. Incinerators may also be used to produce stream for use. Other alternative sources such as solar (for heating water) or alcohol (for combustion engine fuel) may be used.

Other primary impacts include the use of energy during construction. Because energy costs are included in the costs of construction, the energy requirements relating to construction may not be identified beyond the facilities planning documents. Review the facilities plan documentation and GICS to obtain design data.

Secondary impacts associated with energy usage stem from changes in transportation volume and patterns, the development of residential, commercial and industrial areas which determine the patterns of energy consumption, and the associated air quality impacts resulting from the emission.

Data Required

The NEPA documents should be reviewed to obtain the baseline energy consumption. In cases where no facilities existed during facilities planning baseline energy consumption would be zero. Also, the reviewer should obtain the predicted impacts on energy consumption. In some cases, a net energy gain may be realized where obsolete equipment is replaced by energy efficient equipment. Current data regarding the NEPA energy issues should be obtained from the operating entity(s). The treatment plant operations manager is the source of the facilities energy usage. Where off-site operations are included or where sludge may be disposed of by an independent contractor, the operations manager should be sought to obtain additional data.

Specific Steps

1. Identify the predicted impacts. The NEPA document(s) must be reviewed to first determine the regulatory environment under which the document was prepared. Documents prepared prior to the November 6, 1979 regulations for 40CFR6 may address energy only as one of the non-renewable resources. Documents prepared after mid-1980, will likely address energy in a more detailed manner in both the "Alternatives" section and the "Discussion of Environmental Consequences". Most impact predictions will be quantitative absolute, such as:

   > "Fox River Plant - 1,210 thousand kwh/year electricity,
   > 2,465 million BTU/year fuel requirements..."
   > (Source: Fox River EIS)

   Some energy inpacts may be relative, such as:

   > "new pump station will increase energy usage by
   > 81,640 kwh/year."
   > (Hypothetical)

   Qualitative impact predictions are seldom found without some quantifications elsewhere in the document. If a qualitative prediction is given, it usually is in relation to a yet unproven technology such as:

   > "By upgrading the existing incinerators, autogenous
   > burning may be possible...substantial savings in
   > auxiliary energy will be realized...."
   > (Source: EIS, Detroit: Segmented Facilities Plan,
   > Detroit, MI, September 1976)

2. Retrieve operations data for the NEPA parameters addressed. It should be realized that the final design and construction may vary somewhat from the planned facilities. The energy availability at the time may have mandated a change from one fuel type to another. All predictions and actual usage should be converted to equivalent units. The conversions are as follows:

#2 fuel oil................	120,000 BTU/gal
diesel fuel................	140,000 BTU/gal
electric power..............	10,500 BTU/kwh

natural gas..................1,000 BTU/cuft
digester gas..................600 BTU/cuft.

3. By comparing the predicted and actual energy consumption on tables as discussed in Chapter II, the accuracy of impact predictions can be evaluated. One must consider any changes in the treatment process or sludge disposal method that may have been necessitated after NEPA action. Since energy consumption is directly related to flow, any assessment of accuracy should include the flow basis used whether actual or predicted.

Products Required

Evaluation forms must be completed for each individual predicted impact evaluated. A narrative explaining the procedural steps, including justifications of any and all judgments involved, and discussion of the implications and results of the evaluation must be prepared.

CHAPTER XIII

AIR QUALITY ISSUES

Introduction

The impacts of various projects on air quality are most often associated with increased pollutants from point source emissions, area sources, or the direct impacts of construction activities. Point source emissions from Construction Grants facilities are generally evaluated in a regional context concerned with the maintenance of national ambient air quality standards within the boundaries of Air Quality Control Regions (AQCR) established by the states and EPA. The impact of the project on the State Implementation Plan (SIP) may also be an issue. In all cases, the concentration of various pollutants for which ambient air quality standards have been set serve as a basis for determining direct impacts.

The direct impacts of construction related activities are most often confined to small localized areas and are of short-term duration. Examples of these are dust generation or exhaust emissions from construction equipment. While it is possible to monitor the levels of pollutants generated from these activities at the site, such monitoring is not usually conducted.

Secondary impacts of increased air pollutant levels, such as acid rain, lower crop yields caused by ozone destruction of leaves, increased rates of destruction of buildings from higher SO_2 levels, and increased incidence of lung desease or health effects are also potential issues. However, the routine evaluation of such impacts is generally not practiced in Construction Grants NEPA documents due to their complexity and the cost of evaluation.

The objective of this chapter is to provide the reviewer with a method of evaluating the accuracy of NEPA impact preducctions of Construction Grants projects regarding air quality issues. Using this method, the reviewer will be able to compare the "before" and "after" project data for those parameters identified as the primary indicators of air quality impacts. Most air quality issues will be addressed using one or both of two computerized data bases maintained by the EPA's National Air Data Branch (NADB): Storage and Retrieval of Aerometric Data (SAROAD) and the National Emissions Data System (NEDS).

SAROAD contains aerometric data obtained from numerous ambient air quality monitoring stations located throughout the States. Pollutant parameters monitored at these stations are those for which the EPA has established National Ambient Air Quality Standards (NAAQS). These are: total suspended particulates (TSP), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). These stations are normally operated at a local level, but the data obtained are, ultimately, sent to the State EPA or the equivalent. The location of stations are based on a number of criteria including; air pollution levels, population density, geography, and meteorological conditions. It is also important to note that not all parameters are monitored at each station and stations may be relocated from time to time. The parameters to be monitored at each station and the need for relocation depend upon local factors, therefore, it is imperative that the reviewer obtain background information on the monitoring stations from the State EPA or equivalent.

The NEDS data base contains information of specific point and area sources of air pollution emissions. The type of pollutants monitored vary from station (i.e. source) to station, and are based on the processes employed and pollutants emitted from each individual source. For example, area sources are often associated with transportation routes (e.g., a major highway) of which contaminants from exhaust emissions are the major pollutants. In this case, the most common pollutants monitored would be those typical of these sources such as CO, SO_2, NO_2, O_3, Pb, and hydrocarbons. However, a manufacturing facility may emit quite different pollutants and monitoring requirements and parameters for these facilities are tailored to fit each individual facility. Much of the information in the NEDS data base is derived from self-monitoring reports submitted by private companies to the State EPA or equivalent.

Odors are also issues typically addressed in NEPA documents. The measurement of odors, however, is very subjective and controversial. Since odors cannot be measured directly, the reviewer must rely upon information documenting odor complaints. This information can usually be obtained from the county health department, the wastewater treatment plant, or the District or State EPA or its equivalent.

Data Required

The data required depend, to some extent, on the type of project being evaluated. For those projects in which ambient air quality in general is a concern, the SAROAD data base would supply the reviewer with the data required. In addition to the raw data, the reviewer will also need to contact the State EPA or equivalent to obtain background information on the location of stations and the pollutants monitored. Projects with issues centering on the emissions from a stationary source will also require data from NEDS. The reviewer may wish to use these two data bases in combination with one another to identify and relate changes in regional air quality with emissions from individual sources.

Information regarding odor complaints may be derived from sources which vary from project to project. Contact the local health department, the District EPA or equivalent, the State EPA or equivalent, or the facilities operators (e.g., the wastewater treatment plant or landfill, etc.).

Impact predictions are obtained from the NEPA document.

Method

The method consists of five basic steps; (1) determination of baseline ("before" project) air quality, (2) compilation of predicted impacts, (3) determination of actual impacts based on current ("after" project) data, (4) determination of those impacts directly attributable to the project as opposed to those attributable to other actions in the area, and (5) assessment of the accuracy of impact prediction.

The statements of predicted impacts will take one of three forms, as follows: quantitative absolute, quantitative relative, or qualitative. A quantitative absolute prediction states the value of the parameter at some future date (sulfur oxides = 80 ug/m^3, or 0.08 ppm by 1990). Quantitative relative predictions describe the change from base line values at some future date (less than 10% increase over the planning period is expected). A prediction that is qualitative suggests the direction of change, but not the magnitude (construction would be expected to only slightly increase the local dust levels).

For air quality issues, the magnitude of change may not be directly presented in the statements themselves. For example: "An examination of the results of the air dispersion analysis indicated that the impacts....will be minimal" is written as a qualitative statement although the analysis probably produced a quantitative prediction. This type of prediction is often found in the air quality sections of NEPA documents. In almost all cases, the impacts are summarized in qualitative terms regardless of the type of analysis used. The entire NEPA document, especially appendices, may have to be reviewed to retrieve the actual quantitative absolute predicted values. Similarly, "significance" of the predicted impact is frequently determined by whether or not the applicable standards (for ambient air quality) will be exceeded.

Air pollution does not follow defined regional, state, or local jurisdiction boundaries, but may be influenced by sources many miles from the project area. It is not always possible, therefore, to determine if identified changes in pollutant levels are the direct result of the project. The reviewer must recognize this fact when evaluating the accuracy of predictions presented in NEPA documents.

In the event that the NEPA document does not discuss air quality impacts, the reviewer should assume that this implies either no impact or no significant impact was anticipated. The difference between the "before" project or baseline data and the most recent "after" project data can be compared to determine the validity of this implied prediction (i.e. no change in pollutant parameters). If the reviewer discovers that the prediction was not met (e.g. the concentration of pollutants have noticeably increased), the NEPA document and associated planning documents should be reviewed to determine if information contained in the documents may have lead to an alternate prediction. If this type of information is not found, more detailed studies may be required.

Specific Steps

Information obtained from these steps is to be complied using the evaluation forms described in Chapter II.

1. Identify counties and applicable local areas affected. This involves a review of the "Introduction" and "Affected Environment" sections of the NEPA documents to delineate the area(s) for which impacts are predicted.

2. Identify the predicted impacts regarding ambient air quality standards or other identified pollutants in the case of emission sources. The specific pollutant parameters will be based on the emphasis stressed in the NEPA document. The "Impacts", "Affected Environment", and "Appendices" sections of the project NEPA document(s) may have to be reviewed to retrieve the results of the air quality analysis predictions as well as the qualitative summary statement(s). If the most precise prediction is "the standards will be met", then the standards themselves can be taken as an limit boundary on the range of predicted values.

3. Retrieve ambient air quality data for the project area and the AQCR. Specifically, data must be retrieved from SAROAD for monitoring stations in and near the affected area and from NEDS for identified emission sources. If pollutant loadings from point sources are predicted, the NEDS data base will provide current emissions data for these sources. Collect odor complaint data.

4. A comparison of the predicted impact to the current monitoring data will provide the reviewer with a determination of the accuracy of the predicted impacts. For purely qualitative predictions, certain qualifiers (such as slight, insignificant, moderate, substantial, significant) will require subjective professional judgment by the reviewer. In order to assess the potential impacts from other pollutant sources, the reviewer should also contact the State EPA or equivalent to determine if any major new sources have been constructed in the surrounding area since the baseline year. Loadings of pollutants from new sources (determined from NEDS) can be reviewed with respect to prevailing winds and other meteorological data to provide insights into the differences between actual and predicted impacts. The magnitude of impacts from proposed or new sources, however, cannot be quantified without extensive modeling.

Products Required

Evaluation forms must be completed for each prediction, and for each parameter to be evaluated. A narrative on the analysis including an interpretive section discussing the evaluation forms must be prepared.

CHAPTER XIV

INTERRELATED/OTHER ISSUES

UNFORESEEN/UNANTICIPATED IMPACTS

Introduction

In any project the potential exists for impacts to arise which were previously unforeseen. This is not to say that the planners did not do an adequate job or used faulty methods, but simply that certain factors cannot always be taken into account or are not always known in the planning phase. If, for example, the SHPO advises that a survey of the study area will not be required, the applicant rightly assumes there is little possibility of disrupting unknown archaeological materials. This assumption, however, does not guarantee that artifacts will not be encountered during the construction phase. Likewise, if protected open land along an interceptor route was to remain undeveloped because of zoning policies, but the land was later found to be extensively subdivided, it was probably because the planner assumed zoning policies would not change over the planning period.

It must also be understood that NEPA documents are prepared based on Federal, State and local regulations, policies, guidance documents and scientific expertise appropriate and applicable to that period of time (when the term NEPA documents is used in this manual, it refers not only to the EIS, but also to the EID/EA, facilities plan, Draft EIS, and other associated documents). As time passes, the scientific base of knowledge, public concerns and issues all change as do Federal, State and local regulations and policies. As the reviewer examines the NEPA planning documents, it may first appear that certain issues or projections may have been overlooked or omitted when, in fact, at that time, there may have been no particular policy requiring such projections. Also, techniques may have not been available to assess them. For example, EPA's Statement of Procedures on Floodplain Management and Wetlands Protection was not formalized until 1979. Prior to that time, 1973, EPA had policies to examine wetlands and floodplain issues, and, therefore, they may have been addressed differently in the NEPA planning documents.

A list of possible unforeseen or unpredicted impacts is presented below. The reviewer should note that this is in no way an exhaustive listing. It is a sample of ideas a reviewer can build upon. Each project is unique and may result in additional and/or different impacts.

- Increased or decreased recreational opportunities due to changes in land use or wildlife habitat - For example, creation of an artificial wetland at the cost of low value wildlife habitat may result in a predicted loss of small game hunting opportunities for rabbit and squirrel but produce unanticipated opportunities for waterfowl hunting and bird watching.

- The discovery of unknown valuable natural resources including mineral resources - Although this is rare, it nevertheless has been known to occur.

- Loss or contamination of drinking water supplies caused by unforeseen hydrological connections - For example, dewatering for construction may lower groundwater tables. This could cause shallow wells to run dry. Homeowners utilizing shallow wells would then be required to construct new wells or find other sources of drinking water.

- Loss or gain of wetlands caused by unpredicted hydrological connections resulting from construction activities.

- Unforeseen tradeoffs - For example, a lake area may be sewered to reduce or eliminate blue-green algae blooms cause by septic wastes. While blue-green algae populations may be reduced, they may be replaced by nuisance macrophyte species.

- Municipal or sanitary district, entrepreneurship of sludge is not realized causing operation, maintenance and replacement constraints.

- Impacts caused by change orders or construction decisions which are left to the discretion of the contractor - If change orders are made to include service to areas not previously included in the service area, unpredicted impacts associated with these changes can occur. Likewise, if impacts are predicated on an assumed routing of interceptors but the actual routing does not follow this assumption, unpredicted impacts may occur. Routing a pipeline through large salvageable trees to gain salvage value vs. rerouting through small saplings could be an example of these impacts.

- Cost overruns and faulty construction practices are also impacts which are normally unforeseen - These can result in major economic impacts from the project. This is especially a concern if the cost overruns which increase user charges are consistently due to certain construction activities by particular offices or contractors.

- Water quality impacts - The NEPA documents may accurately predict growth along floodplains or streams, but local land use changes could vary zoning ordinances leading to new sources of sedimentation or channelization, which are counterproductive to the stream quality improvements realized through wastewater treatment. The reviewer should always consider potential indirect impacts.

- Cumulative impacts - Individual impacts may be assessed correctly, e.g., as having no significant impact, but when evaluated collectively, as in an aggregate analysis of environmental issues, the combined impacts may cause beneficial or adverse impacts. Action in and beyond the study area or the Construction Grants program could reflect cumulative impacts, for example: the construction of a WWTP may warrant the removal of a small portion of a wildlife corridor, but while the magnitude of the change could be deemed insignificant at the project land, it could, on a broader scope, reflect intrusion into an isthmus-like food supply migratory route.

There is also another group or type of unforeseen impacts which can be considered chronic but correctable. This type of impact is associated with equipment and material failure or inadequate considerations for equipment and/or operations. An example of equipment failure would be if a liner were used for a landfill, and for the purposes of planning, it is assumed the liner would remain intact and no leakage would occur. A failure of this piece of equipment would result in unanticipated impacts which might become serious if groundwater became contaminated. Similarly, planning documents assume a WWTP will be operated to achieve their designed effluent requirements. If this does not occur, unanticipated impacts will result. These could include increased operating costs, degradation of water quality, sludge handling problems, etc.

As previously stated, these examples are not exhaustive and it is the reviewer's responsibility to identify impacts which may have been consistently overlooked by the authors of the NEPA documents. This requires some degree of expertise with impact prediction and environmental review. Only those overlooked impacts which can be directly linked to the project should be addressed. The reviewer should omit those impacts where a clear relationship to the project cannot be established. It is not necessary for the reviewer to absolutely quantify the degree of relationship between the impact and the project (e.g., 40% attributable to the project), but the relationship must be established.

Data Required

Theoretically, there would be an infinite number of unanticipated impacts covering an infinite number of issues. In order to limit the extent of this examination to a manageable level, a regulatory basis has been chosen to serve as a point of reference. The reviewer should use photos, maps, the Code of Federal Regulations and Executive Orders to define issues which must be examined. Textual data required are: 40 CFR Part 6, 40 CFR Parts 1500-1508, and any Executive Orders pertaining to environmental matters, applicable to NEPA documents.

Method

Before the reviewer determines if any unanticipated impacts have occurred, a firm understanding of the baseline leading toward the predictions in the study area should be gained. During the evaluation, the reviewer should also be aware of the areas which are typically examined within current NEPA documents. The separation of procedures during the time of the baseline and current procedures serves to perspectively focus the dual nature of the predicted/actual impact analysis. Once the initial evaluation is completed, the reviewer should re-examine the NEPA document to determine the presence or absence of unanticipated impacts.

Specific Steps

1. A review of the most current NEPA implementing regulations as promulgated under 40 CFR Part 6 and 40CFR Parts 1500-1508 is necessary. Through this evaluation, the reviewer should be able to develop a list of issues typically examined in NEPA documents. This list should be similar to the one presented below which was developed from a review of 40 CFR Parts 6.202 and 6.300.

   Historic & Archaeological Resources
   Wetlands
   Floodplains
   Agricultural Lands
   Coastal Zone Management
   Wild and Scenic Rivers
   Fish and Wildlife
   Rare, Threatened and Endangered Species
   Hydrology
   Geology
   Noise
   Air Quality
   Biology
   Socioeconomics
   Energy
   Land Use
   Cultural Resources

The list developed by the reviewer should be extensive. Once the list is developed, it should be reviewed as one performs the tasks of each issue chapter to remind the reviewer of the potential areas of unanticipated impacts. Although all issues in the list may have been examined, the reviewer of the NEPA document may find items to investigate based upon current procedures of environmental analysis. While the investigation may or may not disclose overlooked issues, every such examination, when documented, helps refine the concepts of significant and no significant impacts.

2. The reviewer should examine the NEPA documents and develop a list of issues addressed in the documents. This is compared to the list of issues from regulations and Executive Orders (as prepared above) to identify issues omitted or apparently addressed insufficiently in the NEPA documents. A third list of omitted or insufficient issues should be prepared. Issues addressed in the NEPA documents are examined as part of the evaluation of actual vs. predicted impacts.

3. After identifying any issues which may have been omitted or were insufficiently addressed, the reviewer should determine if there was any potential for impact. This can be done in-house, via telecommunications and/or on a site visit. For example, if a document did not discuss floodplains, the reviewer should determine if there are any floodplains in the project area. This can be done by checking the maps first, then if necessary, by contacting the Federal Emergency Management Agency or the local agency responsible for Floodplain Insurance. The reviewer can contact the agency and determine through a telephone interview, if any 100-year floodplains exist in the study area. If no floodplains exist, then no unanticipated impacts could have occurred. The reviewer should be sure to document his or her findings. (Telephone interviews, like all crucial questions/answers in the evaluation process, should be transcribed onto an evaluation form.) If the reviewer discovers floodplains do exist, he or she should briefly explain the project to the agency official and then ask if they have any knowledge of impacts which may have occurred as a result of the project. The reviewer should be sure to document their findings (be sure to obtain the telephone number, name and title of the person interviewed). If the agency official has no knowledge of any impacts, the reviewer may also want to contact other local officials such as the Local Planning Agency, County Engineer, Mayor, etc. to verify his or her findings. If necessary, the verification could be made in a site visit. IN NO CASE SHOULD THE REVIEWER TRY TO PREDICT IMPACTS WHICH MAY HAVE BEEN OMITTED FROM THE NEPA DOCUMENT. If all agencies/officials contacted are unable to identify any impacts, and a site visit for this particular issue is not warranted, the reviewer can assume none have occurred. The reviewer should refer to EPA's Directory of Environmental Data Bases for Illinois, Indiana, Michigan, Minnesota,

Ohio and Wisconsin. This directory lists numerous information sources for various environmental issues in Region V.

The reviewer may find that local expertise is not always available for a particular issue. In these cases, the reviewer should try to interview a local official with the greatest probability of having knowledge of a particular issue. Local organizations with environmental concerns, such as the Izaac Walton League, Sierra Club, Local Chapter of The National Wildlife Federation, League of Women Voters, local or regional university professors, etc., can also provide the reviewer with valuable insights into unanticipated impacts.

Products Required

1. List of any unanticipated impacts which have been identified, including a discussion of how the impact is related to the project. The impact does not necessarily have to be quantified.

2. Documentation of all agency/source contacts including a summary of findings; telephone numbers, names, titles, etc.

3. Any data sources upon which a determination of impact was made by a reviewer, agency, official, environmental representative, etc.

4. Current policies, guidelines, regulations, etc. used to determine whether omitted issues were or were not applicable to the project period. Pre-1977/78 projects may not have addressed floodplains and/or wetlands in the manner prescribed by current guidelines. This may be due to changes in EPA requirements since that time.

5. Evaluation form(s).

MITIGATING MEASURES

Introduction

Mitigating Measures are those actions which are taken to reduce the degree or severity of impacts normally associated with a particular action. Mitigating measures can be classified into two groups based upon the permanency of the mitigating measure. These are short-term mitigating measures and long-term or permanent mitigating measures. Examples of short-term migitation measures would be all activities for the abatement of erosion and sedimentation; the control of fugitive emissions (e.g., dust) by wetting roads, the use of water curtains, filters, etc.; the erection of temporary noise or visual barriers; or timing construction activities with environmental conditions which minimized impacts (e.g., stream crossings during low flow conditions). Long-term mitigation measures include permanent visual screens, the use of appropriate treatment technologies (e.g., ozone vs. chlorine to reduce impacts to aquatic species), monitoring programs, such as groundwater monitoring wells, restoration and landscaping, pretreatment, building design, up-to-date user charges, etc.

It is extremely important that the reviewer determine if mitigating measures have been carried out. However, the reviewer must also realize that it may not always be possible to determine if short-term mitigation measures have been followed. Temporary mitigation measures which have already been removed will be unavailable for verification. The extent to which short-term mitigation measures can be evaluated is dependant on the timing of construction activities and other schedules as well as the timing of the NEPA evaluations. These schedules may be described in the NEPA documents. Any long-term mitigation measures, social, economic or geophysical, should be verified. Site visits will often be the preferred method of verification.

Data Required

The reviewer will need to examine the NEPA documents to determine all direct and implied mitigation measures which were to be taken. Through site visits or other means, the reviewer should determine the actual mitigation carried out for the project(s) in question.

Method

The method for evaluating mitigation measures consists of two primary steps: identification of recommended and required measures and verification of actual mitigation measures. Mitigation measures are stated in terms of what is to be done and/or the goal to be achieved. The reviewer will (1) verify the mitigating measures taken and, in many cases, (2) determine if the goal of the measure was met.

Specific Steps

1. The reviewer should examine the NEPA documents to determine the specific mitigation measures which are required and/or recommended. This information is generally in the "Affected Environment", "Environmental Consequences", "Recommendations", or "Grant Conditions" sections of the NEPA documents. Other chapters, however, should not be overlooked. The reviewer should also note those measures which are long-term or short-term.

2. Next, the reviewer verifies the existence or non-existence of the proposed/required mitigator(s). Only those impacts relative to the project should be addressed.

   > "The treatment plant site will be surrounded by existing and planted vegetation and mounds which will serve as additional sound barriers."
   > (Source: EIS, Olentargy Environmental Control Center, 1976, Delaware County, Ohio)

Verification of the mitigators described is most easily accomplished through a site visit. Although the reviewer, depending on the scope of the evaluation study, may not choose to calculate the degree to which vegetation and mounds buffer noise, he/she can see if vegetation has been planted or mounds built and make a qualitative statement based upon that observation.

Products Required

1. A list or description of verifiable mitigating measures from the NEPA documents. This should also include objectives as provided in the documents.

2. Verification of the mitigation measures and a determination of how well the mitigators served to accomplish the associated goal/objective as appropriate.

3. Evaluation form(s).

APPENDIX A

DATA BASE REPORT

APPENDIX A

DATA BASE REPORT

Introduction

The objective of this Appendix is to present a list of computerized and manual data bases which should be used with the Manual for Evaluating Predicted and Actual Impacts of Construction Grants Projects. In general, the evaluation of generic issues or programmatic evaluations is well suited to the use of computerized data bases while reviews of individual projects are best facilitated by the use of manual data files. An evaluation of data bases is presented in Table A-1, which can be found at the end of this Appendix.

Computerized Data Bases

The initial step in analyzing data bases was to first address those data bases and sources included in EPA's preliminary environmental data base report prepared by WAPORA. (Directory of Environmental Data Bases for Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin 1984.) Data available through Corps of Engineers, EPA's Monitoring Systems Laboratory, Fish and Wildlife Service, were also addressed as well as a search of the Encyclopedia of Information Systems and Services published by Gale Research Company (an international guide to computer readable data bases, library and information networks, and library management systems). Several critera were used to evaluate each data base.

- Is it machine readable? If a data base is not machine readable, the cost of putting it into a computer base mode would be prohibitive.
- Is it uniform throughout the region? If we are to compare projects throughout the region with any degree of confidence, the information used must be uniform.
- Is there historic data? Since our analysis will most likely be within the design life of the project, project life impacts will not be able to be addressed directly and therefore deviations from the historic pattern of change must be addressed.
- What is the confidence level in the updating procedures? If any comparison is to be valid or any methodology implemented, there must be some confidence that the information will be updated accurately and on a periodic basis.

Nearly 2,500 computer based data systems are currently available. Approximately 150 address natural and human environmental data relating to environmental impact analysis. Of these, only three meet all of the above criteria for generic project analysis. Even if the resources were available to EPA to make other data systems compatible, the probable cost and the time required would be prohibitive when compared to the benefits derived. In addition, the lack of sufficient historical data would continue to be the major data problem.

All three data bases meeting the previously described criteria are computer based information systems which are currently maintained by federal agencies. These include EPA's Grants Information Control System (GICS) data base, U.S. Census Summary Tape Files 3A, and EPA STORET system.

Grants Information Control System (GICS)

The GICS data are used primarily to provide information on a specific project, including information in its design and construction. GICS information is essential in identifying separate projects and the data includes 30 elements as follows:

GICS Transaction No.	GICS Data Element Name	
01	Serial Number	Full Grant Identification Number
02	Program Code	
03	Amendment Designator	
54	Sequence Number	
04	Legislative Authority	
12	Applicant Name	
13	Applicant State Abbreviation	
14	Applicant City Name	
15	Project County Name	
19B	Cumulative EPA Funds Awarded	
20	Project Description	
23	Action Step Code	
24	Action Step Date	
25	Facility River Basin Code	
32	Authority/Facility Number	
33	Alternative System for Small Communities	
45	Population Code	
92	Percent Wastewater Treatment Construction Complete	
98	Sludge Disposal Techniques/Design	
99	Total Flow Capacity/Design	
B2	Grant # - Parent Project	
C2	Permit Number	
D3	Wastewater Management Technique/Design	
E6	Effluent Discharge/Design	
F5	BOD - Influent Design	
F6	BOD - Effluent Design	
M1	EID Review Code and Data	
N4	Final EIS Code and Date	
N5	Project Completion Code and Date	
N7	Funded Works and Operation Code and Date	

U.S. Census Summary Tape

The U.S. Census of Population and Housing Summary Tape Files 3A is used to provide socio-economic information. Elements of data which can provide useful information include:

Table #	Description
1.	Persons,
6.	Housing Units Total,
10.	Households,
11.	Housing Units Year Round,
65.	Employment by Industry,
140.	Median Housing Value,
141.	Median Household Income,

EPA STORET

STORET is a large-scale computerized STOrage RETrieval system for water pollution measurement data collected from observation stations across the country. This data base was set up as a national repository of physical/chemical water quality data for surface waters throughout the United States. As such, STORET contains not only water quality data from those observation stations which are monitored on a regular basis, but also from stations which are monitored infrequently or even those for which information was collected on a one time basis. Its water pollution data are derived from laboratory analyses of water samples. The data are acquired from the USGS's National Water Data System and from a variety of pollution abatement agencies at federal, state, and local levels each with varying data needs. Because of the differing data needs from agency to agency and from station to station, the parameters analyzed at any one station vary accordingly.

Data Gaps in Computer Systems

Significant gaps currently exist in computerized data bases to facilitate their total use in inplementation of this Manual. Current data bases which met the four criteria were not found for the following parameters:

Soils
Topography
Geology
Plant & Animal Communities
Fish & Wildlife
Noise & Odors
Solid Waste
Energy Resources
Endangered Species Habitat
Rare Ecological Communities
Floodplains
Wetlands
Prime Farmlands
Steep Slopes
Land Use
Historical & Archaeological Sites
Recreation & Open Space

Manual Data Bases

Since machine readable computerized data bases cannot meet all of the data needs for NEPA evaluations, the reviewer will be required to locate and utilize manual data files. Some important sources which should initially be consulted to locate manual data bases are listed on the following pages. For a more detailed listing of sources, the reviewer is advised to examine the Directory of Environmental Data Bases for Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin (WAPORA, 1984).

Data Gaps

There are data gaps in three major areas including noise, odor and aesthetics. Noise and odor are subjective factors and are observer dependent impacts.

While noise is a measurable phenomenon, unless noise measurements were made prior to construction, the only analysis which can be done is in terms of current noise levels. This will require field measurements.

LIMITED SOURCES OF ENVIRONMENTAL DATA*

1. SOILS

State Soil Conservation Service Offices[1]

Soil Conservation Service (SCS)
U.S. Department of Agriculture
Post Office Box 2890
Washington, D.C. 20013
Telephone: 202/447-4543

2. TOPOGRAPHY

Areas east of the Mississippi
U.S. Geological Survey
Eastern Distribution Branch
1200 South Eads Street
Arlington, VA 22202
Telephone: 703/557-2751

Areas west of the Mississippi
U.S. Geological Survey
Western Distribution Branch
Box 25286, Federal Center
Denver, CO 80335

Entire United States
National Cartographic Information Center
507 National Center
Reston, VA 22092
Telephone: 703/860-6045

3. GEOLOGY

U.S. Geological Survey
907 National Center
Reston, VA 22092
Telephone: 703/860-6517

State Geologic Survey Offices[2]

4. PLANT AND ANIMAL COMMUNITIES

U.S. Fish & Wildlife Service
Federal Building, Fort Snelling
Twin Cities, MN 55111
Telephone: 612/725-3500

* For a detailed listing of sources in Region V, see the Directory of Environmental Data Bases for Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin (WAPORA, 1984).

5. SENSITIVE WILDLIFE INFORMATION SYSTEM (SWIS)

   U.S. Army Corps of Engineers
   Waterways Experimental Station
   Post Office Box 631
   Vicksburg, MS 39180

   U.S. Forest Service
   Region 9 - Eastern Region
   633 West Wisconsin Avenue
   Milwaukee, WI 53203
   Telephone: 414/291-3693

   State Sources[3]

6. FISH AND WILDLIFE

   (See Plant and Animal Communities)

7. NOISE AND ODORS

   State EPAs or equivalent[4]

   Local Health Departments

   Facility Offices (e.g. wastewater treatment plants,
   solid waste disposal facilities, etc.)

8. SOLID WASTE

   State EPAs or equivalent[4]

   Local Health Departments

   County Engineer Offices

   Local Planning Agencies[5]

9. ENERGY RESOURCES

   Local Utility Companies

   Facility Offices

10. ENDANGERED SPECIES HABITAT

    (See Plant and Animal Communities)

11. RARE ECOLOGICAL COMMUNITIES

    (See Plant and Animal Communities)

12. FLOODPLAINS

Federal Emergency Management Agency
National Flood Insurance Program
Post Office Box 34222
Bethesda, MD 20817
Telephone: 800/638-6628 or 800/424-8872

NOAA Regional Coast Information Center (RCIC) Network
11400 Rockville Pike
Rockville, MD 20852
Telephone: 301/443-8137

13. WETLANDS

U.S. Fish & Wildlife Service
Federal Building, Fort Snelling
Twin Cities, MN 55111
Telephone: 612/725-3500

14. PRIME FARMLANDS

(See Soils)

15. STEEP SLOPES

(See Topography)

16. LAND USE

Regional Planning Commissions[5]

Soil Conservation Service
Inventory & Monitoring Division
U.S. Department of Agriculture
Post Office Box 2890
Washington, D.C. 20013
Telephone: 202/447-5424

17. HISTORICAL AND ARCHAEOLOGICAL SITES

U.S. Department of the Interior
National Park Service
440 G. Street N.W.
Washington, D.C. 20243
Telephone: 202/343-6401

State Historic Preservation Offices[6]

18. RECREATION AND OPEN SPACES

National Park Service (NPS)
U.S. Department of the Interior
Midwest Regional Office
1709 North Jackson Street
Omaha, NE 68102

Bureau of Land Management
U.S. Department of the Interior
18th & C Streets, N.W.
Washington, D.C. 20240
Telephone: 202/343-5994

Regional Planning Agencies[5]

State Departments of Natural Resources

State Park Departments

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[1] USEPA, Directory of Environmental Databases for Illinois, Indiana, Michigan, Minnesota, Ohio & Wisconsin, 1984. page 31.
[2] Ibid, pages 27-28
[3] Ibid, pages 52-60
[4] Ibid, pages 34-35
[5] Ibid, pages 70-84
[6] Ibid, pages 87-88

TABLE A-1

DATA BASE EVALUATION MATRIX

Title	Useable Data	Machine Readable	Uniform in Region	Historical Data	Adequate Updating	Remarks
° MI Dept. of Natural Resources Wetlands Map	Yes	No	MI	No	No	Wetlands map. partial coverage
° MI Natural Features Inventory	Yes	No	MN	No	Yes	Fish, wildlife, hab.
° WI Dept. of Natural Resources Endangered Res.	Yes	Some	WI	N/A	Yes	not remotely acessible
° Storage & Retrieval for Water Quality Data (STORET)	Yes	Yes	Yes	1960's	Yes	
° National Water Data Storage & Retrieval	Yes	Yes	Yes	1960's	Yes	includes STORET
° Planning Engineering Data Mgmt. System of Ohio	Yes	Yes	OH	No	Yes	ag vs urban landuse, flood
° Wildlife Res. Unit	No	-	—	—	--	
° Resource Inv. Soil Conservation Service		Yes	Yes	1977	5 years	soil loss, veg,floodprone
° WI Geo Survey	Yes	No	WI	Varies	No	well data
° IN Geo Survey	Yes	No	IN	Varies	No	well data
° MI Geo Survey	Yes	No	MI	Varies	No	well data
° IL Consv. Dept.	Yes	No	IL	N/A	Yes	historic sites
° OH Geo Survey	Yes	No	OH	N/A	Yes	well logs
° Fisheries DW MI Dept of Nat. Resources	No	-	—	--	--	fish stocking
° MI Wildlife E&T	Yes	No	MI	No	Yes	wetlands inventory
° MN Dept. of Natural Resources Fisheries	No	-	—	—	--	fish counts
° MN Dept. of Natural Resources Wildlife	Yes	No	MN	No	Yes	wetlands mapping
° IN Dept. of Natural Resources	Yes	Yes	IN	No	Yes	endanger species collect.
° IL Div. of Planning	Yes	Yes	IL	1980	Yes	wetlands inventory
° WI Dept. Local Affairs	Yes	No	WI	Some	Yes	farmland preservation
° Fish & Wildlife Reference Service	No	—	--	--	--	articles-fish & wildlife
° MN State Soil Consv. Service	Yes	No	MN	Some	Periodic	prime ag land
° IN State Soil Consv. Service	Yes	No	IN	Some	Periodic	past wetlands, croplands

TABLE A-1

DATA BASE EVALUATION MATRIX
(Continued)

Title	Useable Data	Machine Readable	Uniform in Region	Historical Data	Adequate Updating	Remarks
° OH Capabilities Analyses Program	Yes	Yes	OH	1973	One time	landuse, floodplains, ag land
° IL Department of Commerce	Yes	Yes	IL	1981	Yes	industrial sites
° MN Land Information Center	Yes	Yes	MN	1969	1980	forest wetlands, ag geo
° Construction Grants Evaluation and Network Tracking System	Yes	Yes	Yes	Yes	Yes	county vs. basin
° Grant Information Control System	Yes	Yes	Yes	Yes	Yes	project data
° CACI Inc.	Yes	Yes	Metro	1962	Census	census manipulation
° IL Floodplain Repository	No	—	—	--	--	index of studies
° MI Info. Center	Yes	Yes	MI	1980	Census	census manipulation
° National Data Planning Corp.	Yes	Yes	Yes	1969	Census	census manipulation
° National Labor Ser.	No	--	--	--	--	labor market experience
° Public Demographics, Inc.	Yes	Yes	Yes	1981	Census	census manipulation
° Sensitive Wildlife Info. System	No	--	--	--	--	habitat mapping
° Soil Conversation Service Soil Staff	No	--	--	--	--	maps soil suitability
° Urban Decisions/NC	Yes	Yes	Yes	1972	Census	file manipulation
° MI Metropolitan Info. Center	Yes	Yes	MI	1981	Census	census manipulation
° OH Dept. of Econ. & Comm. Affairs	No	--	--	--	--	
° Census Tapes	Yes	Yes	Yes	Yes	Census	
° Geographic Base File Dual Independent Map Coding	Yes	Yes	Yes	N/A	N/A	area conversions

N/A = Not Applicable
-- = Data Not Uniform Among States

APPENDIX B

DATA BASE MANAGEMENT

APPENDIX B

DATA BASE MANAGEMENT

Introduction

Although the amount of data produced with each evaluation will vary as mulitiple evaluations are completed, a large amount of data will be assembled. Unless a systematic approach to data management is used, the data will become unwieldy. The purpose of this appendix is to: (1) provide the reviewer with an understanding of the types of data which will need to be stored and retrieved; (2) explain the method of filing to be used; and (3) describe the steps required to the reviewer to implement the system for a specific study.

Types of Data

Three types of data must be maintained in support of this manual. These include computerized data base files, manual data base files and the results of the evaluation. The computerized data base files are Grants Information Control System (GICS), the U.S. Census of Population and Housing Summary Tape Files 3A (STF 3a), and EPA STORET. GICS and STORET are updated by the USEPA as data become available. The STF 3A are updated by the U.S. Department of Commerce at ten-year intervals. Complete summary tape files have not been available, historically, until two or three years after the census year. STF 3A are available at the time of this writing for the 1980 census and have been purchased by the USEPA, Air Programs, Strategy & Air Standards Division at Research Triangle Park, North Carolina.

While some manual data base files may be maintained by USEPA, others must be retrieved from their source on an "as needed" basis. In both cases, the files must be uniformly catalogued in order to allow the user to quickly find the file for use. Likewise, once a file is obtained from another source, a cataloguing system must already be in place in order to eliminate duplication of data collection in future evaluations.

The evaluation results will produce two types of data; the evaluation forms and the narrative discussions. The extent of the evaluation results is dependent on the objectives of the specific evaluation and the issues associated with the project.

Method of Cataloging

Computerized Data Base Files: The computer data base files will be in the Statistical Analysis System (SAS) data sets. All data can be stored if common elements are included. (See Evaluation Form, Figure II.1). The common elements within the GICS file are state, county and local applicant names as well as the Needs (or Facility) Number. All projects which are evaluated must select a single or several common elements. STORET data are catalogued (and retrieved) using the Needs Number, state, county, and river basin, and latitude and longitude designations. STF 3A can be catalogued by state, county and place (city, village or township). If, for example, a SAS data set is to require the merging of all three data bases, the common array (or single) element(s) must assure linkage among the dissimilar files.

Manual Data Base Files: Data base files which are not computer based must have a four level cataloguing system. Initially, the data base must be filed by issue. The issues must conform to the issues which divide this manual into chapters. The second level of cataloging is the parameters used as indicators of impacts. The third level is to catalogue by state. Once the state is identified, the only uniform indicator or geographic location is the latitude and longitude. Effectively, both computerized and manual data bases share common identifiers. An example of this system would be as follows:

CULTURAL RESOURCES ISSUES

Archeological Sites

Indiana

41°37' N, 87°30' W

Evaluation Results: The evaluation forms have been developed as computer input forms. If they are filed in a computer, they will be retrievable via any of the elements in the form, but files cannot be sorted beyond the year for element #8 and elements #10 through #13. If the narrative report is not entered in the computer, it should be catalogued via the Facilities Number and Project Name. If it is a part of the computer's word processing element, it can be catalogued via the same common elements of the computerized data base files.

Specific Steps

Based upon a review of data to be managed, an approach for data base management is presented. The following steps should be followed to implement this system.

1. Set up filing system for the specific project. At the time of this writing, the computer based filing system has not been set up. When the computer filing system is on line it will consist of a SAS manipulated data set using a FORTRAN programmed system of prompts. Until the computer filing system is on line a hard copy file for the project must be set up using the catalogue system discussed above.

2. Set up File for the Evaluation Forms and Narrative Report. Prior to embarking on the actual evaluation, the file for the evaluation forms and narrative report must be set up. The narrative report must contain the identification elements discussed above.

3. Insure that most recent census information is available. After the 1990 census, it will be necessary to obtain the 1990 STF 3A or the equivalent.

4. Retrieve Computer Data Bases. After the issues are identified, the appropriate computer data bases must be accessed and the information retrieved and filed for use in the evaluation.

5. Retrieve Manual Data Bases. The manual data bases which are required must be retrieved for the evaluation. See the Appendix A, for sources.

6. File Results. Once the evaluation is complete, the results must be filed properly to insure future retrieval.

7. Purge Files. Once the evaluation results are filed, the hard copies (print-outs) of the STORET and STF 3A data should be deleted. There is no reason to keep such data when it can be retrieved from the original computer files. Likewise, the information from STORET and STF 3A, which is contained in the computerized project files, should be deleted since it can be retrieved from STORET and STF 3A at any time in the future.

APPENDIX C

ANNOTATED BIBLIOGRAPHY

APPENDIX C

ANNOTATED BIBLIOGRAPHY

Introduction

This annotated bibliography is provided as Appendix C to the Manual for Evaluation of Predicted and Actual Environmental Impacts for Construction Grants Projects in order to provide the user with additional sources of information. It is anticipated that any review of NEPA documentation may identify issues which have not been addressed by this manual or situations which are unique to a specific project. This bibliography will provide the reader with an identification of the documents and a brief abstract of their content in order to allow the reader to understand how they might assist him in his evaluation.

The bibliography is not meant to be an exhaustive listing of the literature pertaining to environmental impact analysis, but rather those deemed to be pertinent by the writers of this Manual.

Bascom, S.E., K.G. Cooper et.al., 1975. Secondary Impacts of Transportation and Wastewater Investments, Council on Environmental Equality, Department of Housing and Urban Development, and Environmental Protection Agency, Washington, D.C.

A broad picture of the impact of public investment in transportation and wastewater facilities is provided. Because most of the research at the time of the writing of the document was in transportation facilities, that is its emphasis. Much of the work done prior to 1975 included large modeling of metropolitan areas and this is reflected in the body of the document.

Canter, L. 1979. Environmental Impact Statements on Municipal Wastewater Programs. Information Resources Press. Washington, D.C.

A series of suggestions and recommendations for improving EIS's on wastewater facilities was provided in this document. It first provided a substantive review and analysis of draft and final EIS's on wastewater facilities plans, identified their deficiencies and strong points, and determined the degree to which EPA was addressing critical issues in wastewater planning. The goal of the document was to provide guidance in preparing better EIS's and thus increase the effectiveness of wastewater management planning. The actual projects for these EIS's were not analyzed nor were the after construction impacts. Only the EIS document itself was examined. The document provides good insight into what types of issues and how those issues were addressed in a number of wastewater treatment environmental impact statements.

Christensen, K. 1976. Social Impacts of Land Development. Urban Institute Washington, D.C.

This is one of five documents by the Urban Institute addressing the impacts of land development. The report suggests an approach and data collection procedures to enable planners to estimate the social impact of proposed land development. It provides an insight into the relationship of land development and social impacts such as recreational patterns and use, shopping opportunities, pedestrian mobility, perceived quality of the national environment, safety and privacy, aesthetics and cultural values. It also provides a discussion of the approaches to estimating impacts which could be used to verify impact analysis by field study.

Fitzpatrick, M. J. Wilson, et.al., 1971. Manual for Evaluating Secondary Impacts of Waste Water Treatment Facilities, U.S. EPA, Washington, D.C.

The Manual provides procedures for assessing secondary impacts, including both subjective and objective impact analyses. It is unique in that it provides more than one level of analysis in its description. The first level approach as they describe it is an initial estimate; the second level approach is to provide a refinement of the judgemental findings; and the third level is to project growth and allocate population and industrial activity. This document can provide the reviewer with an understanding of the differences which he will find among NEPA documents.

Keyes, D. 1976. Land Development and the Natural Environment: Estimating Impacts. Urban Institute, Washington, D.C.

Four areas of environmental impact from development are addressed. They are air quality, water quality and quantity, wildlife and vegetation, and noise. A brief discussion of landslides subsidence, earthquakes, agricultural land, mineral deposits, and unique natural features is also provided. The various methodological approaches for estimating impacts are addressed as well as the measurements and indices for estimating impacts. This document has some excellent information for a person entering the area of impact analysis. It should provide that person with sufficient information to understand and where expert experience is required and where the planner can do the impact analysis.

Muller, T. 1977. Economic Impacts of Land Development. Urban Institute, Washington, D.C.

The economic impact analysis in this report is limited to employment, housing, and real property values. It not only addresses the issues well, but also provides cause and effect analysis of the interaction among employment and other economic impacts. It provides an analysis of the methods for estimating impacts and the data requirements for such analyses.

Muller, T. 1975. Fiscal Impacts of Land Development. Urban Institute, Washington, D.C.

The fiscal impact analysis provided in this document is of much greater detail than normally used in environmental impact analysis. The document was designed for projecting cost revenue for new land development. The analysis performed in the explanations can give the reader an understanding of the interaction between development and the costs of government.

Schaenman, P., and T. Muller, 1976. Measuring Impacts of Land Development: An Initial Approach. Urban Institute, Washington, D.C.

The overall approach addressed in this document provides the reader with a source document for finding quantifiable impact measures for many areas. Although originally developed for land development, most of the measures have validity in any project requiring major public investment.

Schaenman, P., 1978. Using an Impact Measurement System to Evaluate Land Development. Urban Institute, Washington, D.C.

This document builds on Schaenman and Muller's "Measuring Impacts of Land Development." It provides preferred measures for impact analysis; the fall back measures of impact; and the basis for estimates. The impact measures are for land development but are applicable to any public investment. If a new area of impact not covered by the Manual is identified, this is an ideal source for developing additional methodological statements on evaluation of predicted and actual impacts.

Urban Systems Research & Engineering. 1974. The Growth Shapers, Council on Environmental Quality. Washington, D.C.

Growth Shapers is the primer for identifying the relationships within secondary impacts. It ties together all elements of infrastructure, investments, and land use changes. It should be required reading for anyone addressing secondary impacts for wastewater facilities.

Urban Systems Research & Engineering. 1974. Interceptor Sewers and Suburban Sprawl. Council on Environmental Quality. Washington, D.C.

The impact of Construction Grants on Residential Land Use is the sub-title of this study. It addresses the issues of how construction grants policy and surburban sprawl are interrelated. It also provides recommendations to the council on environmental quality, some of which were adopted after its publication. The objective of the study was to reduce the impact of interceptor sewers rather than measure the impacts of interceptor sewers.

State of New Jersey, 1975. Secondary Impacts of Regional Sewerage Systems. New Jersey Division of State and Regional Planning. Albany, NY

The most valuable element of this manual are the case studies which it provides to give an understanding of the causes of secondary impacts. It also provides suggestions for regulatory controls.

WAPORA, 1980. Manual for Assessing Growth Related Impacts in Delaware County, Ohio. EPA Region V, Chicago, IL.

This document provides a good comprehensive approach to monitor environmental changes related to population growth. It emphazes the identification of measurable prameters which best represent important features of the regional environment.

WAPORA, 1983. Directory of Environmental Data Bases for Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. EPA, Region V. Chicago, IL.

The directory provides a good source of information for one doing environmental assessments within Region V of EPA. Every person preparing an environmental assessment or environmental impact statement should have a copy of the directory as their initial source document for data libraries.

WAPORA, 1983a. Environmental Review Manual for the Construction Grants Program - Wisconsin Department of Natural Resources. U.S. EPA, 1983.

The Environmental Review Manual for each of the states should be available to the reviewer when evaluating a NEPA document prepared after the publication of the Environmental Review Manual. It provides the minimum requirements for the evaluation of environmental impacts and allows the reviewer to understand the guidelines provided to the preparer of the NEPA document. It also provides a list of contacts for information on various impact analyses in each state.

APPENDIX D

HOW TO PROVIDE INPUT FOR FUTURE REVISIONS TO THIS MANUAL

Provide comments to:

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